



ALS Environmental
ALS Group USA, Corp
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www.alsglobal.com

June 19, 2018

Analytical Report for Service Request No: K1805026

Mike Smith
Applied EcoSystems, Inc.
G-4300 South Saginaw Street
Burton, MI 48529

RE: RACER Flint West #12994 / 11-4317-102

Dear Mike,

Enclosed are the results of the sample(s) submitted to our laboratory May 30, 2018
For your reference, these analyses have been assigned our service request number **K1805026**.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

A handwritten signature in black ink, appearing to read "C. Leaf".
Chris Leaf
Project Manager



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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdpb.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.alsglobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Case Narrative

ALS Environmental—Kelso Laboratory
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Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994
Sample Matrix: Water

Service Request: K1805026
Date Received: 05/30/2018

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier III deliverables including summary forms for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt:

Eight water samples were received for analysis at ALS Environmental on 05/30/2018. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Semivolatiles by GC/MS:

No significant anomalies were noted with this analysis.

Organic LC:

Method PFC/537M, 06/06/2018: The upper control criterion was exceeded for 4:2 Fluorotelomer sulfonic acid (4:2 FTS) in Lab Control Sample (LCS) KQ1807475-03. The analyte in question was not detected above the Method Reporting Limit (MRL) in the associated field samples. The error associated with elevated recovery indicated a high bias. The sample data was not significantly affected. No further corrective action was appropriate.

Method PFC/537M, 06/06/2018: The upper control criterion was exceeded for 13C2-4:2 FTS and 13C2-6:2 FTS in sample MW-112S. The associated native analytes were not detected above the Method Reporting Limit (MRL) in this sample. Assuming the native analytes performed similar to the labeled analogs, the effect on the reported results was minimal. The quality of the sample data was not significantly affected. No further corrective action was appropriate.

Approved by

A handwritten signature in black ink, appearing to read 'C. Leaf', is placed over a horizontal line.

Date 06/19/2018



Chain of Custody

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SR# K180 5030

COC Set 1 of 1

COC#

Page 1 of 1

Project Name Racer Flint West #12994	Project Number 11-4317-102	Project Manager Mike Smith	Company Applied EcoSystems, Inc.	Address G-4300 South Saginaw St, Burton, Michigan	Phone # 810-715-2525	Email msmith@appliedecosystems.com	Sampler Signature <i>Heather Dean</i>	Sampler Printed Name Heather Dean	NUMBER OF CONTAINERS	7D 8270D / 1,4-Dioxane LL	14D 9FC/537M / PFOS	1	2	3	4	5	6	7	8	9	10	Remarks	
CLIENT SAMPLE ID	LABID	SAMPLING Date	Time	Matrix																			
1. MW-101S		5/29/18	12:22	W	2	X	X																
2. MW-102S		5/29/18	13:08	W	2	X	X																
3. MW-111S		5/29/18	10:54	W	2	X	X																
4. MW-112S		5/29/18	14:02	W	2	X	X																
5. Field DUP		5/29/18		W	2	X	X																
6. Field Blank		5/29/18	10:30	W	2	X	X																
7. Equip Blank		5/29/18	15:30	W	2	X	X																
8. Trip Blank		5/29/18		W	2	X	X																
9.																							
10.																							

Report Requirements <p><input type="checkbox"/> I. Routine Report: Method Blank, Surrogate, as required</p> <p><input checked="" type="checkbox"/> II. Report Dup., MS, MSD as required</p> <p><input type="checkbox"/> III. CLP Like Summary (no raw data)</p> <p><input type="checkbox"/> IV. Data Validation Report</p> <p><input type="checkbox"/> V. EDD</p>	Invoice Information <p>P.O.# <u>11-4317-102</u></p> <p>Bill To: Applied EcoSystems, Inc.</p>		<input type="checkbox"/> Circle which metals are to be analyzed Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg																	
	Turnaround Requirements <p>24 hr. <input type="checkbox"/> 48 hr. 5 Day <input checked="" type="checkbox"/> Standard</p>		Special Instructions/Comments: *Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other <input type="checkbox"/> (Circle One)																	

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
<i>Heather Dean</i>	<i>Cody Graves</i>				
Printed Name Heather Dean	Printed Name <i>ALC</i>	Printed Name	Printed Name	Printed Name	Printed Name
Firm Applied EcoSystems, Inc.	Date/Time 5/30/18 0815	Firm	Firm	Firm	Firm
Date/Time 5:40pm	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

5/29/18

PC CL

Cooler Receipt and Preservation Form

Client ANVIL Ecosystem Service Request K18 05026
 Received: 5-30-18 Opened: 5-30-18 By: JSP Unloaded: 5-30-18 By: JSP

1. Samples were received via? **USPS** **Fed Ex** **UPS** **DHL** **PDX** **Courier** **Hand Delivered**
2. Samples were received in: (circle) **Cooler** **Box** **Envelope** **Other** **NA**
3. Were custody seals on coolers? **NA** **Y** N If yes, how many and where? 2 Top Front
 If present, were custody seals intact? **Y** N If present, were they signed and dated? **Y** N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
5.7	5.9	5.7	5.9	10.1	356	89832	1Z 2R4 3A6 15 6568 2345		

4. Packing material: **Inserts** **Baggies** **Bubble Wrap** **Gel Packs** **Wet Ice** **Dry Ice** **Sleeves** _____
5. Were custody papers properly filled out (ink, signed, etc.)? **NA** **Y** N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.*
 If applicable, tissue samples were received: **Frozen** **Partially Thawed** **Thawed**
7. Were all sample labels complete (i.e analysis, preservation, etc.)? **NA** **Y** N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* **NA** **Y** N
9. Were appropriate bottles/containers and volumes received for the tests indicated? **NA** **Y** **N**
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* **NA** Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* **NA** Y N
12. Was C12/Res negative? **NA** Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head- space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions:

Col says Diroxane for Field Blank & Liquid Blank But No Burnes Received for it



Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water
Sample Name: MW-101S
Lab Code: K1805026-001

Service Request: K1805026
Date Collected: 05/29/18 12:22
Date Received: 05/30/18 08:05

Units: ng/L
Basis: NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids							
Perfluorobutane sulfonic acid (PFBS)	ND U	4.5	0.90	1	06/06/18 14:31	6/5/18	
Perfluoropentane sulfonic acid (PFPeS)	ND U	5.0	5.0	1	06/06/18 14:31	6/5/18	
Perfluorohexane sulfonic acid (PFHxS)	1.4 J	4.5	0.94	1	06/06/18 14:31	6/5/18	
Perfluoroheptane sulfonic acid (PFHps)	ND U	4.5	0.88	1	06/06/18 14:31	6/5/18	
Perfluorooctane sulfonic acid (PFOS)	12	4.5	1.0	1	06/06/18 14:31	6/5/18	
Perfluorononane sulfonic acid (PFNS)	ND U	5.0	5.0	1	06/06/18 14:31	6/5/18	
Perfluorodecane sulfonic acid (PFDS)	ND U	4.5	1.3	1	06/06/18 14:31	6/5/18	
Perfluoroalkane Carboxylic Acids							
Perfluorobutanoic acid (PFBA)	ND U	8.9	2.7	1	06/06/18 14:31	6/5/18	
Perfluoropentanoic acid (PFPeA)	ND U	4.5	1.1	1	06/06/18 14:31	6/5/18	
Perfluorohexanoic acid (PFHxA)	ND U	4.5	0.92	1	06/06/18 14:31	6/5/18	
Perfluoroheptanoic acid (PFHpA)	ND U	4.5	1.2	1	06/06/18 14:31	6/5/18	
Perfluorooctanoic acid (PFOA)	2.0	1.8	0.46	1	06/06/18 14:31	6/5/18	
Perfluorononanoic acid (PFNA)	1.1 J	4.5	0.94	1	06/06/18 14:31	6/5/18	
Perfluorodecanoic acid (PFDA)	ND U	4.5	0.52	1	06/06/18 14:31	6/5/18	
Perfluoroundecanoic acid (PFUnDA)	ND U	4.5	0.31	1	06/06/18 14:31	6/5/18	
Perfluorododecanoic acid (PFDoDA)	0.51 J	4.5	0.46	1	06/06/18 14:31	6/5/18	
Perfluorotridecanoic acid (PFTrDA)	0.82 J	4.5	0.75	1	06/06/18 14:31	6/5/18	
Perfluorotetradecanoic acid (PFTeDA)	1.4 J	4.5	1.2	1	06/06/18 14:31	6/5/18	
Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide (FOSA)	ND U	4.5	0.35	1	06/06/18 14:31	6/5/18	
N-Methyl perfluorooctane sulfonamidoacetic acid	ND U	8.0	4.2	1	06/06/18 14:31	6/5/18	
N-Ethyl perfluorooctane sulfonamidoacetic acid	ND U	4.5	0.83	1	06/06/18 14:31	6/5/18	
(n:2) Fluorotelomer Sulfonic Acids							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ND U	4.5	0.65	1	06/06/18 14:31	6/5/18	*
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ND U	4.5	1.2	1	06/06/18 14:31	6/5/18	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ND U	4.5	0.65	1	06/06/18 14:31	6/5/18	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18 12:22
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: MW-101S **Units:** ng/L
Lab Code: K1805026-001 **Basis:** NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C3-PFBS	61	10 - 122	06/06/18 14:31	
18O2-PFHxS	71	26 - 144	06/06/18 14:31	
13C4-PFOS	79	27 - 142	06/06/18 14:31	
13C4-PFBA	80	37 - 151	06/06/18 14:31	
13C5-PFPeA	85	23 - 154	06/06/18 14:31	
13C2-PFHxA	82	27 - 155	06/06/18 14:31	
13C4-PFHpA	80	20 - 153	06/06/18 14:31	
13C4-PFOA	84	31 - 142	06/06/18 14:31	
13C5-PFNA	84	27 - 146	06/06/18 14:31	
13C2-PFDA	76	22 - 155	06/06/18 14:31	
13C2-PFUnDA	76	26 - 138	06/06/18 14:31	
13C2-PFDODA	71	24 - 131	06/06/18 14:31	
13C2-PFTeDA	65	16 - 136	06/06/18 14:31	
13C8-FOSA	70	19 - 123	06/06/18 14:31	
D3-MeFOSAA	61	18 - 129	06/06/18 14:31	
D5-EtFOSAA	59	19 - 128	06/06/18 14:31	
13C2-4:2 FTS	75	50 - 150	06/06/18 14:31	
13C2-6:2 FTS	79	10 - 173	06/06/18 14:31	
13C2-8:2 FTS	78	10 - 190	06/06/18 14:31	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water
Sample Name: MW-102S
Lab Code: K1805026-002

Service Request: K1805026
Date Collected: 05/29/18 13:08
Date Received: 05/30/18 08:05

Units: ng/L
Basis: NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids							
Perfluorobutane sulfonic acid (PFBS)	1.3 J	3.9	0.90	1	06/06/18 14:42	6/5/18	
Perfluoropentane sulfonic acid (PFPeS)	ND U	5.0	5.0	1	06/06/18 14:42	6/5/18	
Perfluorohexane sulfonic acid (PFHxS)	2.0 J	3.9	0.94	1	06/06/18 14:42	6/5/18	
Perfluoroheptane sulfonic acid (PFHps)	1.8 J	3.9	0.88	1	06/06/18 14:42	6/5/18	
Perfluorooctane sulfonic acid (PFOS)	12	3.9	1.0	1	06/06/18 14:42	6/5/18	
Perfluorononane sulfonic acid (PFNS)	ND U	5.0	5.0	1	06/06/18 14:42	6/5/18	
Perfluorodecane sulfonic acid (PFDS)	ND U	4.0	1.3	1	06/06/18 14:42	6/5/18	
Perfluoroalkane Carboxylic Acids							
Perfluorobutanoic acid (PFBA)	ND U	8.0	2.7	1	06/06/18 14:42	6/5/18	
Perfluoropentanoic acid (PFPeA)	1.2 J	4.0	1.1	1	06/06/18 14:42	6/5/18	
Perfluorohexanoic acid (PFHxA)	1.8 J	3.9	0.92	1	06/06/18 14:42	6/5/18	
Perfluoroheptanoic acid (PFHpA)	1.7 J	4.0	1.2	1	06/06/18 14:42	6/5/18	
Perfluorooctanoic acid (PFOA)	4.2	1.6	0.46	1	06/06/18 14:42	6/5/18	
Perfluorononanoic acid (PFNA)	1.0 J	3.9	0.94	1	06/06/18 14:42	6/5/18	
Perfluorodecanoic acid (PFDA)	ND U	3.9	0.52	1	06/06/18 14:42	6/5/18	
Perfluoroundecanoic acid (PFUnDA)	ND U	3.9	0.31	1	06/06/18 14:42	6/5/18	
Perfluorododecanoic acid (PFDODA)	ND U	3.9	0.46	1	06/06/18 14:42	6/5/18	
Perfluorotridecanoic acid (PFTrDA)	ND U	3.9	0.75	1	06/06/18 14:42	6/5/18	
Perfluorotetradecanoic acid (PFTeDA)	1.2 J	4.0	1.2	1	06/06/18 14:42	6/5/18	
Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide (FOSA)	ND U	3.9	0.35	1	06/06/18 14:42	6/5/18	
N-Methyl perfluorooctane sulfonamidoacetic acid	ND U	8.0	4.2	1	06/06/18 14:42	6/5/18	
N-Ethyl perfluorooctane sulfonamidoacetic acid	ND U	3.9	0.83	1	06/06/18 14:42	6/5/18	
(n:2) Fluorotelomer Sulfonic Acids							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ND U	3.9	0.65	1	06/06/18 14:42	6/5/18	*
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ND U	4.0	1.2	1	06/06/18 14:42	6/5/18	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ND U	3.9	0.65	1	06/06/18 14:42	6/5/18	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18 13:08
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: MW-102S **Units:** ng/L
Lab Code: K1805026-002 **Basis:** NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C3-PFBS	60	10 - 122	06/06/18 14:42	
18O2-PFHxS	77	26 - 144	06/06/18 14:42	
13C4-PFOS	72	27 - 142	06/06/18 14:42	
13C4-PFBA	75	37 - 151	06/06/18 14:42	
13C5-PFPeA	80	23 - 154	06/06/18 14:42	
13C2-PFHxA	82	27 - 155	06/06/18 14:42	
13C4-PFHpA	82	20 - 153	06/06/18 14:42	
13C4-PFOA	77	31 - 142	06/06/18 14:42	
13C5-PFNA	76	27 - 146	06/06/18 14:42	
13C2-PFDA	69	22 - 155	06/06/18 14:42	
13C2-PFU _n DA	64	26 - 138	06/06/18 14:42	
13C2-PFD _o DA	59	24 - 131	06/06/18 14:42	
13C2-PFTeDA	57	16 - 136	06/06/18 14:42	
13C8-FOSA	63	19 - 123	06/06/18 14:42	
D3-MeFOSAA	55	18 - 129	06/06/18 14:42	
D5-EtFOSAA	50	19 - 128	06/06/18 14:42	
13C2-4:2 FTS	77	50 - 150	06/06/18 14:42	
13C2-6:2 FTS	72	10 - 173	06/06/18 14:42	
13C2-8:2 FTS	62	10 - 190	06/06/18 14:42	

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Analytical Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water
Sample Name: MW-111S
Lab Code: K1805026-003

Service Request: K1805026
Date Collected: 05/29/18 10:54
Date Received: 05/30/18 08:05

Units: ng/L
Basis: NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids							
Perfluorobutane sulfonic acid (PFBS)	ND U	3.9	0.90	1	06/06/18 14:52	6/5/18	
Perfluoropentane sulfonic acid (PFPeS)	ND U	5.0	5.0	1	06/06/18 14:52	6/5/18	
Perfluorohexane sulfonic acid (PFHxS)	1.6 J	3.9	0.94	1	06/06/18 14:52	6/5/18	
Perfluoroheptane sulfonic acid (PFHps)	ND U	3.9	0.88	1	06/06/18 14:52	6/5/18	
Perfluorooctane sulfonic acid (PFOS)	47	3.9	1.0	1	06/06/18 14:52	6/5/18	
Perfluorononane sulfonic acid (PFNS)	ND U	5.0	5.0	1	06/06/18 14:52	6/5/18	
Perfluorodecane sulfonic acid (PFDS)	ND U	4.0	1.3	1	06/06/18 14:52	6/5/18	
Perfluoroalkane Carboxylic Acids							
Perfluorobutanoic acid (PFBA)	ND U	8.0	2.7	1	06/06/18 14:52	6/5/18	
Perfluoropentanoic acid (PFPeA)	ND U	4.0	1.1	1	06/06/18 14:52	6/5/18	
Perfluorohexanoic acid (PFHxA)	ND U	3.9	0.92	1	06/06/18 14:52	6/5/18	
Perfluoroheptanoic acid (PFHpA)	ND U	4.0	1.2	1	06/06/18 14:52	6/5/18	
Perfluorooctanoic acid (PFOA)	1.7	1.6	0.46	1	06/06/18 14:52	6/5/18	
Perfluorononanoic acid (PFNA)	ND U	3.9	0.94	1	06/06/18 14:52	6/5/18	
Perfluorodecanoic acid (PFDA)	ND U	3.9	0.52	1	06/06/18 14:52	6/5/18	
Perfluoroundecanoic acid (PFUnDA)	ND U	3.9	0.31	1	06/06/18 14:52	6/5/18	
Perfluorododecanoic acid (PFDoDA)	ND U	3.9	0.46	1	06/06/18 14:52	6/5/18	
Perfluorotridecanoic acid (PFTrDA)	0.78 J	3.9	0.75	1	06/06/18 14:52	6/5/18	
Perfluorotetradecanoic acid (PFTeDA)	ND U	4.0	1.2	1	06/06/18 14:52	6/5/18	
Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide (FOSA)	ND U	3.9	0.35	1	06/06/18 14:52	6/5/18	
N-Methyl perfluorooctane sulfonamidoacetic acid	ND U	8.0	4.2	1	06/06/18 14:52	6/5/18	
N-Ethyl perfluorooctane sulfonamidoacetic acid	ND U	3.9	0.83	1	06/06/18 14:52	6/5/18	
(n:2) Fluorotelomer Sulfonic Acids							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ND U	3.9	0.65	1	06/06/18 14:52	6/5/18	*
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ND U	4.0	1.2	1	06/06/18 14:52	6/5/18	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ND U	3.9	0.65	1	06/06/18 14:52	6/5/18	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18 10:54
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: MW-111S **Units:** ng/L
Lab Code: K1805026-003 **Basis:** NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C3-PFBS	55	10 - 122	06/06/18 14:52	
18O2-PFHxS	66	26 - 144	06/06/18 14:52	
13C4-PFOS	73	27 - 142	06/06/18 14:52	
13C4-PFBA	61	37 - 151	06/06/18 14:52	
13C5-PFPeA	57	23 - 154	06/06/18 14:52	
13C2-PFHxA	56	27 - 155	06/06/18 14:52	
13C4-PFHpA	61	20 - 153	06/06/18 14:52	
13C4-PFOA	66	31 - 142	06/06/18 14:52	
13C5-PFNA	81	27 - 146	06/06/18 14:52	
13C2-PFDA	73	22 - 155	06/06/18 14:52	
13C2-PFUnDA	73	26 - 138	06/06/18 14:52	
13C2-PFDoDA	62	24 - 131	06/06/18 14:52	
13C2-PFTeDA	57	16 - 136	06/06/18 14:52	
13C8-FOSA	67	19 - 123	06/06/18 14:52	
D3-MeFOSAA	52	18 - 129	06/06/18 14:52	
D5-EtFOSAA	53	19 - 128	06/06/18 14:52	
13C2-4:2 FTS	116	50 - 150	06/06/18 14:52	
13C2-6:2 FTS	161	10 - 173	06/06/18 14:52	
13C2-8:2 FTS	134	10 - 190	06/06/18 14:52	

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Analytical Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water
Sample Name: MW-112S
Lab Code: K1805026-004

Service Request: K1805026
Date Collected: 05/29/18 14:02
Date Received: 05/30/18 08:05

Units: ng/L
Basis: NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids							
Perfluorobutane sulfonic acid (PFBS)	ND U	3.9	0.90	1	06/06/18 15:03	6/5/18	
Perfluoropentane sulfonic acid (PFPeS)	ND U	5.0	5.0	1	06/06/18 15:03	6/5/18	
Perfluorohexane sulfonic acid (PFHxS)	ND U	3.9	0.94	1	06/06/18 15:03	6/5/18	
Perfluoroheptane sulfonic acid (PFHps)	ND U	3.9	0.88	1	06/06/18 15:03	6/5/18	
Perfluorooctane sulfonic acid (PFOS)	27	3.9	1.0	1	06/06/18 15:03	6/5/18	
Perfluorononane sulfonic acid (PFNS)	ND U	5.0	5.0	1	06/06/18 15:03	6/5/18	
Perfluorodecane sulfonic acid (PFDS)	ND U	4.0	1.3	1	06/06/18 15:03	6/5/18	
Perfluoroalkane Carboxylic Acids							
Perfluorobutanoic acid (PFBA)	41	8.0	2.7	1	06/06/18 15:03	6/5/18	
Perfluoropentanoic acid (PFPeA)	1.7 J	4.0	1.1	1	06/06/18 15:03	6/5/18	
Perfluorohexanoic acid (PFHxA)	ND U	3.9	0.92	1	06/06/18 15:03	6/5/18	
Perfluoroheptanoic acid (PFHpA)	ND U	4.0	1.2	1	06/06/18 15:03	6/5/18	
Perfluorooctanoic acid (PFOA)	2.5	1.6	0.46	1	06/06/18 15:03	6/5/18	
Perfluorononanoic acid (PFNA)	1.8 J	3.9	0.94	1	06/06/18 15:03	6/5/18	
Perfluorodecanoic acid (PFDA)	ND U	3.9	0.52	1	06/06/18 15:03	6/5/18	
Perfluoroundecanoic acid (PFUnDA)	0.61 J	3.9	0.31	1	06/06/18 15:03	6/5/18	
Perfluorododecanoic acid (PFDODA)	ND U	3.9	0.46	1	06/06/18 15:03	6/5/18	
Perfluorotridecanoic acid (PFTrDA)	0.85 J	3.9	0.75	1	06/06/18 15:03	6/5/18	
Perfluorotetradecanoic acid (PFTeDA)	ND U	4.0	1.2	1	06/06/18 15:03	6/5/18	
Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide (FOSA)	ND U	3.9	0.35	1	06/06/18 15:03	6/5/18	
N-Methyl perfluorooctane sulfonamidoacetic acid	ND U	8.0	4.2	1	06/06/18 15:03	6/5/18	
N-Ethyl perfluorooctane sulfonamidoacetic acid	ND U	3.9	0.83	1	06/06/18 15:03	6/5/18	
(n:2) Fluorotelomer Sulfonic Acids							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ND U	3.9	0.65	1	06/06/18 15:03	6/5/18	*
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ND U	4.0	1.2	1	06/06/18 15:03	6/5/18	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ND U	3.9	0.65	1	06/06/18 15:03	6/5/18	

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Analytical Report

Client:	Applied EcoSystems, Inc.	Service Request:	K1805026
Project:	RACER Flint West #12994/11-4317-102	Date Collected:	05/29/18 14:02
Sample Matrix:	Water	Date Received:	05/30/18 08:05
Sample Name:	MW-112S	Units:	ng/L
Lab Code:	K1805026-004	Basis:	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C3-PFBS	52	10 - 122	06/06/18 15:03	
18O2-PFHxS	51	26 - 144	06/06/18 15:03	
13C4-PFOS	49	27 - 142	06/06/18 15:03	
13C4-PFBA	62	37 - 151	06/06/18 15:03	
13C5-PFPeA	78	23 - 154	06/06/18 15:03	
13C2-PFHxA	69	27 - 155	06/06/18 15:03	
13C4-PFHpA	65	20 - 153	06/06/18 15:03	
13C4-PFOA	62	31 - 142	06/06/18 15:03	
13C5-PFNA	71	27 - 146	06/06/18 15:03	
13C2-PFDA	42	22 - 155	06/06/18 15:03	
13C2-PFUnDA	36	26 - 138	06/06/18 15:03	
13C2-PFDoDA	40	24 - 131	06/06/18 15:03	
13C2-PFTeDA	62	16 - 136	06/06/18 15:03	
13C8-FOSA	48	19 - 123	06/06/18 15:03	
D3-MeFOSAA	55	18 - 129	06/06/18 15:03	
D5-EtFOSAA	55	19 - 128	06/06/18 15:03	
13C2-4:2 FTS	165	50 - 150	06/06/18 15:03	*
13C2-6:2 FTS	212	10 - 173	06/06/18 15:03	*
13C2-8:2 FTS	148	10 - 190	06/06/18 15:03	

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Analytical Report

Client:	Applied EcoSystems, Inc.	Service Request:	K1805026
Project:	RACER Flint West #12994/11-4317-102	Date Collected:	05/29/18
Sample Matrix:	Water	Date Received:	05/30/18 08:05
Sample Name:	Field DUP	Units:	ng/L
Lab Code:	K1805026-005	Basis:	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids							
Perfluorobutane sulfonic acid (PFBS)	1.2 J	3.9	0.90	1	06/06/18 15:13	6/5/18	
Perfluoropentane sulfonic acid (PFPeS)	ND U	5.0	5.0	1	06/06/18 15:13	6/5/18	
Perfluorohexane sulfonic acid (PFHxS)	2.0 J	3.9	0.94	1	06/06/18 15:13	6/5/18	
Perfluoroheptane sulfonic acid (PFHps)	1.1 J	3.9	0.88	1	06/06/18 15:13	6/5/18	
Perfluorooctane sulfonic acid (PFOS)	12	3.9	1.0	1	06/06/18 15:13	6/5/18	
Perfluorononane sulfonic acid (PFNS)	ND U	5.0	5.0	1	06/06/18 15:13	6/5/18	
Perfluorodecane sulfonic acid (PFDS)	ND U	4.0	1.3	1	06/06/18 15:13	6/5/18	
Perfluoroalkane Carboxylic Acids							
Perfluorobutanoic acid (PFBA)	ND U	8.0	2.7	1	06/06/18 15:13	6/5/18	
Perfluoropentanoic acid (PFPeA)	ND U	4.0	1.1	1	06/06/18 15:13	6/5/18	
Perfluorohexanoic acid (PFHxA)	2.5 J	3.9	0.92	1	06/06/18 15:13	6/5/18	
Perfluoroheptanoic acid (PFHpA)	ND U	4.0	1.2	1	06/06/18 15:13	6/5/18	
Perfluorooctanoic acid (PFOA)	4.3	1.6	0.46	1	06/06/18 15:13	6/5/18	
Perfluorononanoic acid (PFNA)	ND U	3.9	0.94	1	06/06/18 15:13	6/5/18	
Perfluorodecanoic acid (PFDA)	ND U	3.9	0.52	1	06/06/18 15:13	6/5/18	
Perfluoroundecanoic acid (PFUnDA)	ND U	3.9	0.31	1	06/06/18 15:13	6/5/18	
Perfluorododecanoic acid (PFDODA)	ND U	3.9	0.46	1	06/06/18 15:13	6/5/18	
Perfluorotridecanoic acid (PFTrDA)	ND U	3.9	0.75	1	06/06/18 15:13	6/5/18	
Perfluorotetradecanoic acid (PFTeDA)	ND U	4.0	1.2	1	06/06/18 15:13	6/5/18	
Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide (FOSA)	ND U	3.9	0.35	1	06/06/18 15:13	6/5/18	
N-Methyl perfluorooctane sulfonamidoacetic acid	ND U	8.0	4.2	1	06/06/18 15:13	6/5/18	
N-Ethyl perfluorooctane sulfonamidoacetic acid	ND U	3.9	0.83	1	06/06/18 15:13	6/5/18	
(n:2) Fluorotelomer Sulfonic Acids							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ND U	3.9	0.65	1	06/06/18 15:13	6/5/18	*
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ND U	4.0	1.2	1	06/06/18 15:13	6/5/18	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ND U	3.9	0.65	1	06/06/18 15:13	6/5/18	

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Analytical Report

Client:	Applied EcoSystems, Inc.	Service Request:	K1805026
Project:	RACER Flint West #12994/11-4317-102	Date Collected:	05/29/18
Sample Matrix:	Water	Date Received:	05/30/18 08:05
Sample Name:	Field DUP	Units:	ng/L
Lab Code:	K1805026-005	Basis:	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C3-PFBS	56	10 - 122	06/06/18 15:13	
18O2-PFHxS	65	26 - 144	06/06/18 15:13	
13C4-PFOS	64	27 - 142	06/06/18 15:13	
13C4-PFBA	65	37 - 151	06/06/18 15:13	
13C5-PFPeA	77	23 - 154	06/06/18 15:13	
13C2-PFHxA	78	27 - 155	06/06/18 15:13	
13C4-PFHpA	73	20 - 153	06/06/18 15:13	
13C4-PFOA	69	31 - 142	06/06/18 15:13	
13C5-PFNA	67	27 - 146	06/06/18 15:13	
13C2-PFDA	61	22 - 155	06/06/18 15:13	
13C2-PFUUnDA	59	26 - 138	06/06/18 15:13	
13C2-PFDODA	57	24 - 131	06/06/18 15:13	
13C2-PFTeDA	65	16 - 136	06/06/18 15:13	
13C8-FOSA	57	19 - 123	06/06/18 15:13	
D3-MeFOSAA	51	18 - 129	06/06/18 15:13	
D5-EtFOSAA	49	19 - 128	06/06/18 15:13	
13C2-4:2 FTS	77	50 - 150	06/06/18 15:13	
13C2-6:2 FTS	76	10 - 173	06/06/18 15:13	
13C2-8:2 FTS	66	10 - 190	06/06/18 15:13	

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Analytical Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water
Sample Name: Field Blank
Lab Code: K1805026-006

Service Request: K1805026
Date Collected: 05/29/18 10:30
Date Received: 05/30/18 08:05

Units: ng/L
Basis: NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids							
Perfluorobutane sulfonic acid (PFBS)	ND U	4.2	0.90	1	06/06/18 15:23	6/5/18	
Perfluoropentane sulfonic acid (PFPeS)	ND U	5.0	5.0	1	06/06/18 15:23	6/5/18	
Perfluorohexane sulfonic acid (PFHxS)	ND U	4.2	0.94	1	06/06/18 15:23	6/5/18	
Perfluoroheptane sulfonic acid (PFHps)	ND U	4.2	0.88	1	06/06/18 15:23	6/5/18	
Perfluorooctane sulfonic acid (PFOS)	ND U	4.2	1.0	1	06/06/18 15:23	6/5/18	
Perfluorononane sulfonic acid (PFNS)	ND U	5.0	5.0	1	06/06/18 15:23	6/5/18	
Perfluorodecane sulfonic acid (PFDS)	ND U	4.2	1.3	1	06/06/18 15:23	6/5/18	
Perfluoroalkane Carboxylic Acids							
Perfluorobutanoic acid (PFBA)	ND U	8.5	2.7	1	06/06/18 15:23	6/5/18	
Perfluoropentanoic acid (PFPeA)	ND U	4.2	1.1	1	06/06/18 15:23	6/5/18	
Perfluorohexanoic acid (PFHxA)	ND U	4.2	0.92	1	06/06/18 15:23	6/5/18	
Perfluoroheptanoic acid (PFHpA)	ND U	4.2	1.2	1	06/06/18 15:23	6/5/18	
Perfluorooctanoic acid (PFOA)	ND U	1.7	0.46	1	06/06/18 15:23	6/5/18	
Perfluorononanoic acid (PFNA)	ND U	4.2	0.94	1	06/06/18 15:23	6/5/18	
Perfluorodecanoic acid (PFDA)	ND U	4.2	0.52	1	06/06/18 15:23	6/5/18	
Perfluoroundecanoic acid (PFUnDA)	ND U	4.2	0.31	1	06/06/18 15:23	6/5/18	
Perfluorododecanoic acid (PFDoDA)	ND U	4.2	0.46	1	06/06/18 15:23	6/5/18	
Perfluorotridecanoic acid (PFTrDA)	0.94 J	4.2	0.75	1	06/06/18 15:23	6/5/18	
Perfluorotetradecanoic acid (PFTeDA)	ND U	4.2	1.2	1	06/06/18 15:23	6/5/18	
Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide (FOSA)	ND U	4.2	0.35	1	06/06/18 15:23	6/5/18	
N-Methyl perfluorooctane sulfonamidoacetic acid	ND U	8.0	4.2	1	06/06/18 15:23	6/5/18	
N-Ethyl perfluorooctane sulfonamidoacetic acid	ND U	4.2	0.83	1	06/06/18 15:23	6/5/18	
(n:2) Fluorotelomer Sulfonic Acids							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ND U	4.2	0.65	1	06/06/18 15:23	6/5/18	*
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ND U	4.2	1.2	1	06/06/18 15:23	6/5/18	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ND U	4.2	0.65	1	06/06/18 15:23	6/5/18	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18 10:30
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: Field Blank **Units:** ng/L
Lab Code: K1805026-006 **Basis:** NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C3-PFBS	59	10 - 122	06/06/18 15:23	
18O2-PFHxS	67	26 - 144	06/06/18 15:23	
13C4-PFOS	74	27 - 142	06/06/18 15:23	
13C4-PFBA	74	37 - 151	06/06/18 15:23	
13C5-PFPeA	87	23 - 154	06/06/18 15:23	
13C2-PFHxA	84	27 - 155	06/06/18 15:23	
13C4-PFHpA	77	20 - 153	06/06/18 15:23	
13C4-PFOA	77	31 - 142	06/06/18 15:23	
13C5-PFNA	75	27 - 146	06/06/18 15:23	
13C2-PFDA	70	22 - 155	06/06/18 15:23	
13C2-PFUnDA	69	26 - 138	06/06/18 15:23	
13C2-PFDoDA	65	24 - 131	06/06/18 15:23	
13C2-PFTeDA	70	16 - 136	06/06/18 15:23	
13C8-FOSA	65	19 - 123	06/06/18 15:23	
D3-MeFOSAA	63	18 - 129	06/06/18 15:23	
D5-EtFOSAA	63	19 - 128	06/06/18 15:23	
13C2-4:2 FTS	68	50 - 150	06/06/18 15:23	
13C2-6:2 FTS	73	10 - 173	06/06/18 15:23	
13C2-8:2 FTS	82	10 - 190	06/06/18 15:23	

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Analytical Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water
Sample Name: Equip Blank
Lab Code: K1805026-007

Service Request: K1805026
Date Collected: 05/29/18 15:30
Date Received: 05/30/18 08:05

Units: ng/L
Basis: NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids							
Perfluorobutane sulfonic acid (PFBS)	ND U	4.2	0.90	1	06/06/18 15:34	6/5/18	
Perfluoropentane sulfonic acid (PFPeS)	ND U	5.0	5.0	1	06/06/18 15:34	6/5/18	
Perfluorohexane sulfonic acid (PFHxS)	ND U	4.2	0.94	1	06/06/18 15:34	6/5/18	
Perfluoroheptane sulfonic acid (PFHps)	ND U	4.2	0.88	1	06/06/18 15:34	6/5/18	
Perfluorooctane sulfonic acid (PFOS)	ND U	4.2	1.0	1	06/06/18 15:34	6/5/18	
Perfluorononane sulfonic acid (PFNS)	ND U	5.0	5.0	1	06/06/18 15:34	6/5/18	
Perfluorodecane sulfonic acid (PFDS)	ND U	4.2	1.3	1	06/06/18 15:34	6/5/18	
Perfluoroalkane Carboxylic Acids							
Perfluorobutanoic acid (PFBA)	ND U	8.5	2.7	1	06/06/18 15:34	6/5/18	
Perfluoropentanoic acid (PFPeA)	ND U	4.2	1.1	1	06/06/18 15:34	6/5/18	
Perfluorohexanoic acid (PFHxA)	ND U	4.2	0.92	1	06/06/18 15:34	6/5/18	
Perfluoroheptanoic acid (PFHpA)	ND U	4.2	1.2	1	06/06/18 15:34	6/5/18	
Perfluorooctanoic acid (PFOA)	ND U	1.7	0.46	1	06/06/18 15:34	6/5/18	
Perfluorononanoic acid (PFNA)	ND U	4.2	0.94	1	06/06/18 15:34	6/5/18	
Perfluorodecanoic acid (PFDA)	ND U	4.2	0.52	1	06/06/18 15:34	6/5/18	
Perfluoroundecanoic acid (PFUnDA)	ND U	4.2	0.31	1	06/06/18 15:34	6/5/18	
Perfluorododecanoic acid (PFDODA)	ND U	4.2	0.46	1	06/06/18 15:34	6/5/18	
Perfluorotridecanoic acid (PFTrDA)	1.1 J	4.2	0.75	1	06/06/18 15:34	6/5/18	
Perfluorotetradecanoic acid (PFTeDA)	ND U	4.2	1.2	1	06/06/18 15:34	6/5/18	
Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide (FOSA)	ND U	4.2	0.35	1	06/06/18 15:34	6/5/18	
N-Methyl perfluorooctane sulfonamidoacetic acid	ND U	8.0	4.2	1	06/06/18 15:34	6/5/18	
N-Ethyl perfluorooctane sulfonamidoacetic acid	ND U	4.2	0.83	1	06/06/18 15:34	6/5/18	
(n:2) Fluorotelomer Sulfonic Acids							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ND U	4.2	0.65	1	06/06/18 15:34	6/5/18	*
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ND U	4.2	1.2	1	06/06/18 15:34	6/5/18	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ND U	4.2	0.65	1	06/06/18 15:34	6/5/18	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18 15:30
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: Equip Blank **Units:** ng/L
Lab Code: K1805026-007 **Basis:** NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C3-PFBS	54	10 - 122	06/06/18 15:34	
18O2-PFHxS	64	26 - 144	06/06/18 15:34	
13C4-PFOS	77	27 - 142	06/06/18 15:34	
13C4-PFBA	69	37 - 151	06/06/18 15:34	
13C5-PFPeA	79	23 - 154	06/06/18 15:34	
13C2-PFHxA	80	27 - 155	06/06/18 15:34	
13C4-PFHpA	70	20 - 153	06/06/18 15:34	
13C4-PFOA	76	31 - 142	06/06/18 15:34	
13C5-PFNA	96	27 - 146	06/06/18 15:34	
13C2-PFDA	71	22 - 155	06/06/18 15:34	
13C2-PFUUnDA	71	26 - 138	06/06/18 15:34	
13C2-PFDoDA	60	24 - 131	06/06/18 15:34	
13C2-PFTeDA	63	16 - 136	06/06/18 15:34	
13C8-FOSA	62	19 - 123	06/06/18 15:34	
D3-MeFOSAA	59	18 - 129	06/06/18 15:34	
D5-EtFOSAA	63	19 - 128	06/06/18 15:34	
13C2-4:2 FTS	68	50 - 150	06/06/18 15:34	
13C2-6:2 FTS	79	10 - 173	06/06/18 15:34	
13C2-8:2 FTS	86	10 - 190	06/06/18 15:34	

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Analytical Report

Client:	Applied EcoSystems, Inc.	Service Request:	K1805026
Project:	RACER Flint West #12994/11-4317-102	Date Collected:	05/29/18
Sample Matrix:	Water	Date Received:	05/30/18 08:05
Sample Name:	Trip Blank	Units:	ng/L
Lab Code:	K1805026-008	Basis:	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids							
Perfluorobutane sulfonic acid (PFBS)	ND U	4.2	0.90	1	06/06/18 15:44	6/5/18	
Perfluoropentane sulfonic acid (PFPeS)	ND U	5.0	5.0	1	06/06/18 15:44	6/5/18	
Perfluorohexane sulfonic acid (PFHxS)	ND U	4.2	0.94	1	06/06/18 15:44	6/5/18	
Perfluoroheptane sulfonic acid (PFHps)	ND U	4.2	0.88	1	06/06/18 15:44	6/5/18	
Perfluorooctane sulfonic acid (PFOS)	ND U	4.2	1.0	1	06/06/18 15:44	6/5/18	
Perfluorononane sulfonic acid (PFNS)	ND U	5.0	5.0	1	06/06/18 15:44	6/5/18	
Perfluorodecane sulfonic acid (PFDS)	ND U	4.2	1.3	1	06/06/18 15:44	6/5/18	
Perfluoroalkane Carboxylic Acids							
Perfluorobutanoic acid (PFBA)	ND U	8.3	2.7	1	06/06/18 15:44	6/5/18	
Perfluoropentanoic acid (PFPeA)	ND U	4.2	1.1	1	06/06/18 15:44	6/5/18	
Perfluorohexanoic acid (PFHxA)	ND U	4.2	0.92	1	06/06/18 15:44	6/5/18	
Perfluoroheptanoic acid (PFHpA)	ND U	4.2	1.2	1	06/06/18 15:44	6/5/18	
Perfluorooctanoic acid (PFOA)	ND U	1.7	0.46	1	06/06/18 15:44	6/5/18	
Perfluorononanoic acid (PFNA)	ND U	4.2	0.94	1	06/06/18 15:44	6/5/18	
Perfluorodecanoic acid (PFDA)	ND U	4.2	0.52	1	06/06/18 15:44	6/5/18	
Perfluoroundecanoic acid (PFUnDA)	ND U	4.2	0.31	1	06/06/18 15:44	6/5/18	
Perfluorododecanoic acid (PFDoDA)	ND U	4.2	0.46	1	06/06/18 15:44	6/5/18	
Perfluorotridecanoic acid (PFTrDA)	ND U	4.2	0.75	1	06/06/18 15:44	6/5/18	
Perfluorotetradecanoic acid (PFTeDA)	ND U	4.2	1.2	1	06/06/18 15:44	6/5/18	
Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide (FOSA)	ND U	4.2	0.35	1	06/06/18 15:44	6/5/18	
N-Methyl perfluorooctane sulfonamidoacetic acid	ND U	8.0	4.2	1	06/06/18 15:44	6/5/18	
N-Ethyl perfluorooctane sulfonamidoacetic acid	ND U	4.2	0.83	1	06/06/18 15:44	6/5/18	
(n:2) Fluorotelomer Sulfonic Acids							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ND U	4.2	0.65	1	06/06/18 15:44	6/5/18	*
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ND U	4.2	1.2	1	06/06/18 15:44	6/5/18	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ND U	4.2	0.65	1	06/06/18 15:44	6/5/18	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: Trip Blank **Units:** ng/L
Lab Code: K1805026-008 **Basis:** NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C3-PFBS	61	10 - 122	06/06/18 15:44	
18O2-PFHxS	73	26 - 144	06/06/18 15:44	
13C4-PFOS	73	27 - 142	06/06/18 15:44	
13C4-PFBA	73	37 - 151	06/06/18 15:44	
13C5-PFPeA	87	23 - 154	06/06/18 15:44	
13C2-PFHxA	82	27 - 155	06/06/18 15:44	
13C4-PFHpA	78	20 - 153	06/06/18 15:44	
13C4-PFOA	77	31 - 142	06/06/18 15:44	
13C5-PFNA	71	27 - 146	06/06/18 15:44	
13C2-PFDA	67	22 - 155	06/06/18 15:44	
13C2-PFUnDA	63	26 - 138	06/06/18 15:44	
13C2-PFDoDA	62	24 - 131	06/06/18 15:44	
13C2-PFTeDA	71	16 - 136	06/06/18 15:44	
13C8-FOSA	60	19 - 123	06/06/18 15:44	
D3-MeFOSAA	62	18 - 129	06/06/18 15:44	
D5-EtFOSAA	64	19 - 128	06/06/18 15:44	
13C2-4:2 FTS	65	50 - 150	06/06/18 15:44	
13C2-6:2 FTS	83	10 - 173	06/06/18 15:44	
13C2-8:2 FTS	79	10 - 190	06/06/18 15:44	

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Analytical Report

Client:	Applied EcoSystems, Inc.	Service Request:	K1805026
Project:	RACER Flint West #12994/11-4317-102	Date Collected:	NA
Sample Matrix:	Water	Date Received:	NA
Sample Name:	Method Blank	Units:	ng/L
Lab Code:	KQ1807475-04	Basis:	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids							
Perfluorobutane sulfonic acid (PFBS)	ND U	5.0	0.90	1	06/06/18 14:10	6/5/18	
Perfluoropentane sulfonic acid (PFPeS)	ND U	5.0	5.0	1	06/06/18 14:10	6/5/18	
Perfluorohexane sulfonic acid (PFHxS)	ND U	5.0	0.94	1	06/06/18 14:10	6/5/18	
Perfluoroheptane sulfonic acid (PFHps)	ND U	5.0	0.88	1	06/06/18 14:10	6/5/18	
Perfluorooctane sulfonic acid (PFOS)	ND U	5.0	1.0	1	06/06/18 14:10	6/5/18	
Perfluorononane sulfonic acid (PFNS)	ND U	5.0	5.0	1	06/06/18 14:10	6/5/18	
Perfluorodecane sulfonic acid (PFDS)	ND U	5.0	1.3	1	06/06/18 14:10	6/5/18	
Perfluoroalkane Carboxylic Acids							
Perfluorobutanoic acid (PFBA)	ND U	10	2.7	1	06/06/18 14:10	6/5/18	
Perfluoropentanoic acid (PFPeA)	ND U	5.0	1.1	1	06/06/18 14:10	6/5/18	
Perfluorohexanoic acid (PFHxA)	ND U	5.0	0.92	1	06/06/18 14:10	6/5/18	
Perfluoroheptanoic acid (PFHpA)	ND U	5.0	1.2	1	06/06/18 14:10	6/5/18	
Perfluorooctanoic acid (PFOA)	ND U	2.0	0.46	1	06/06/18 14:10	6/5/18	
Perfluorononanoic acid (PFNA)	ND U	5.0	0.94	1	06/06/18 14:10	6/5/18	
Perfluorodecanoic acid (PFDA)	ND U	5.0	0.52	1	06/06/18 14:10	6/5/18	
Perfluoroundecanoic acid (PFUnDA)	ND U	5.0	0.31	1	06/06/18 14:10	6/5/18	
Perfluorododecanoic acid (PFDODA)	ND U	5.0	0.46	1	06/06/18 14:10	6/5/18	
Perfluorotridecanoic acid (PFTrDA)	0.79 J	5.0	0.75	1	06/06/18 14:10	6/5/18	
Perfluorotetradecanoic acid (PFTeDA)	ND U	5.0	1.2	1	06/06/18 14:10	6/5/18	
Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide (FOSA)	ND U	5.0	0.35	1	06/06/18 14:10	6/5/18	
N-Methyl perfluorooctane sulfonamidoacetic acid	ND U	8.0	4.2	1	06/06/18 14:10	6/5/18	
N-Ethyl perfluorooctane sulfonamidoacetic acid	ND U	5.0	0.83	1	06/06/18 14:10	6/5/18	
(n:2) Fluorotelomer Sulfonic Acids							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ND U	5.0	0.65	1	06/06/18 14:10	6/5/18	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ND U	5.0	1.2	1	06/06/18 14:10	6/5/18	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ND U	5.0	0.65	1	06/06/18 14:10	6/5/18	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** NA
Sample Matrix: Water **Date Received:** NA

Sample Name: Method Blank **Units:** ng/L
Lab Code: KQ1807475-04 **Basis:** NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C3-PFBS	59	10 - 122	06/06/18 14:10	
18O2-PFHxS	64	26 - 144	06/06/18 14:10	
13C4-PFOS	78	27 - 142	06/06/18 14:10	
13C4-PFBA	71	37 - 151	06/06/18 14:10	
13C5-PFPeA	85	23 - 154	06/06/18 14:10	
13C2-PFHxA	76	27 - 155	06/06/18 14:10	
13C4-PFHpA	82	20 - 153	06/06/18 14:10	
13C4-PFOA	72	31 - 142	06/06/18 14:10	
13C5-PFNA	76	27 - 146	06/06/18 14:10	
13C2-PFDA	73	22 - 155	06/06/18 14:10	
13C2-PFU _n DA	71	26 - 138	06/06/18 14:10	
13C2-PFD _o DA	64	24 - 131	06/06/18 14:10	
13C2-PFTeDA	68	16 - 136	06/06/18 14:10	
13C8-FOSA	69	19 - 123	06/06/18 14:10	
D3-MeFOSAA	64	18 - 129	06/06/18 14:10	
D5-EtFOSAA	62	19 - 128	06/06/18 14:10	
13C2-4:2 FTS	67	50 - 150	06/06/18 14:10	
13C2-6:2 FTS	69	10 - 173	06/06/18 14:10	
13C2-8:2 FTS	75	10 - 190	06/06/18 14:10	

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026

SURROGATE RECOVERY SUMMARY

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M

Extraction Method: EPA 3535A

Surrogate	Control Limits	MW-101S	MW-102S	MW-111S
		K1805026-001	K1805026-002	K1805026-003
13C3-PFBS	10-122	61	60	55
18O2-PFHxS	26-144	71	77	66
13C4-PFOS	27-142	79	72	73
13C4-PFBA	37-151	80	75	61
13C5-PFPeA	23-154	85	80	57
13C2-PFHxA	27-155	82	82	56
13C4-PFHpA	20-153	80	82	61
13C4-PFOA	31-142	84	77	66
13C5-PFNA	27-146	84	76	81
13C2-PFDA	22-155	76	69	73
13C2-PFUnDA	26-138	76	64	73
13C2-PFDoDA	24-131	71	59	62
13C2-PFTeDA	16-136	65	57	57
13C8-FOSA	19-123	70	63	67
D3-MeFOSAA	18-129	61	55	52
D5-EtFOSAA	19-128	59	50	53
13C2-4:2 FTS	50-150	75	77	116
13C2-6:2 FTS	10-173	79	72	161
13C2-8:2 FTS	10-190	78	62	134

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with an pound (#) indicate the control criteria is not acceptable.

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026

SURROGATE RECOVERY SUMMARY

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M

Extraction Method: EPA 3535A

Surrogate	Control Limits	MW-112S	Field DUP	Field Blank
		K1805026-004	K1805026-005	K1805026-006
13C3-PFBS	10-122	52	56	59
18O2-PFHxS	26-144	51	65	67
13C4-PFOS	27-142	49	64	74
13C4-PFBA	37-151	62	65	74
13C5-PFPeA	23-154	78	77	87
13C2-PFHxA	27-155	69	78	84
13C4-PFHpA	20-153	65	73	77
13C4-PFOA	31-142	62	69	77
13C5-PFNA	27-146	71	67	75
13C2-PFDA	22-155	42	61	70
13C2-PFUnDA	26-138	36	59	69
13C2-PFDoDA	24-131	40	57	65
13C2-PFTeDA	16-136	62	65	70
13C8-FOSA	19-123	48	57	65
D3-MeFOSAA	18-129	55	51	63
D5-EtFOSAA	19-128	55	49	63
13C2-4:2 FTS	50-150	165*	77	68
13C2-6:2 FTS	10-173	212*	76	73
13C2-8:2 FTS	10-190	148	66	82

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with an pound (#) indicate the control criteria is not acceptable.

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026

SURROGATE RECOVERY SUMMARY

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Extraction Method: EPA 3535A

Surrogate	Control Limits	Equip Blank	Trip Blank	Method Blank
		K1805026-007	K1805026-008	KQ1807475-04
13C3-PFBS	10-122	54	61	59
18O2-PFHxS	26-144	64	73	64
13C4-PFOS	27-142	77	73	78
13C4-PFBA	37-151	69	73	71
13C5-PFPeA	23-154	79	87	85
13C2-PFHxA	27-155	80	82	76
13C4-PFHpA	20-153	70	78	82
13C4-PFOA	31-142	76	77	72
13C5-PFNA	27-146	96	71	76
13C2-PFDA	22-155	71	67	73
13C2-PFUnDA	26-138	71	63	71
13C2-PFDoDA	24-131	60	62	64
13C2-PFTeDA	16-136	63	71	68
13C8-FOSA	19-123	62	60	69
D3-MeFOSAA	18-129	59	62	64
D5-EtFOSAA	19-128	63	64	62
13C2-4:2 FTS	50-150	68	65	67
13C2-6:2 FTS	10-173	79	83	69
13C2-8:2 FTS	10-190	86	79	75

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with an pound (#) indicate the control criteria is not acceptable.

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026

SURROGATE RECOVERY SUMMARY

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Extraction Method: EPA 3535A

Surrogate	Control Limits	Lab Control Sample
		KQ1807475-03
13C3-PFBS	10-122	62
18O2-PFHxS	26-144	71
13C4-PFOS	27-142	80
13C4-PFBA	37-151	73
13C5-PFPeA	23-154	87
13C2-PFHxA	27-155	73
13C4-PFHpA	20-153	92
13C4-PFOA	31-142	71
13C5-PFNA	27-146	79
13C2-PFDA	22-155	76
13C2-PFUnDA	26-138	71
13C2-PFDoDA	24-131	65
13C2-PFTeDA	16-136	72
13C8-FOSA	19-123	73
D3-MeFOSAA	18-129	65
D5-EtFOSAA	19-128	65
13C2-4:2 FTS	50-150	67
13C2-6:2 FTS	10-173	75
13C2-8:2 FTS	10-190	77

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with an pound (#) indicate the control criteria is not acceptable.

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102

Service Request:K1805026
Date Analyzed:06/06/18 13:49

Internal Standard Area and RT SUMMARY
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

File ID: J:\LCMS06\Data\060618_b1\060618_006
Instrument ID: K-LCMS-06
Analysis Method: PFC/537M

Lab Code:KQ1807567-01
Analysis Lot:593759
Signal ID:1

	D3-MeFOSA	
	Area	RT
ICAL Result ==>	656,486	5.595
Upper Limit ==>	1,312,972	6.60
Lower Limit ==>	328,243	4.60

Associated Analyses

Continuing Calibration Blank	KQ1807567-02	727647	5.602
Method Blank	KQ1807475-04	914589	5.607
Lab Control Sample	KQ1807475-03	881353	5.608
MW-101S	K1805026-001	840719	5.607
MW-102S	K1805026-002	826923	5.604
MW-111S	K1805026-003	918338	5.602
MW-112S	K1805026-004	1096264	5.608
Field DUP	K1805026-005	909196	5.605
Field Blank	K1805026-006	856557	5.605
Equip Blank	K1805026-007	917672	5.604
Trip Blank	K1805026-008	825118	5.601

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026
Date Analyzed: 06/06/18
Date Extracted: 06/05/18

Lab Control Sample Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method:	PFC/537M	Units:	ng/L
Prep Method:	EPA 3535A	Basis:	NA
		Analysis Lot:	593759

Lab Control Sample
KQ1807475-03

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	131	150	87 *	11-81
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	166	152	109	39-161
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	142	154	92	39-144
N-Ethyl perfluoroctane sulfonamidoacetic acid	175	160	109	40-166
N-Methyl perfluoroctane sulfonamidoacetic acid	155	160	97	48-162
Perfluorobutane sulfonic acid (PFBS)	132	142	93	48-164
Perfluorobutanoic acid (PFBA)	184	160	115	47-147
Perfluorodecane sulfonic acid (PFDS)	128	154	83	35-155
Perfluorodecanoic acid (PFDA)	189	160	118	54-139
Perfluorododecanoic acid (PFDODA)	185	160	116	51-155
Perfluoroheptane sulfonic acid (PFHPS)	190	153	125	47-156
Perfluoroheptanoic acid (PFHpA)	167	160	104	46-153
Perfluorohexane sulfonic acid (PFHxS)	153	146	105	46-145
Perfluorohexanoic acid (PFHxA)	194	160	121	44-148
Perfluorononane sulfonic acid (PFNS)	143	154	93	70-130
Perfluorononanoic acid (PFNA)	176	160	110	47-155
Perfluorooctane sulfonamide (FOSA)	142	160	89	35-146
Perfluorooctane sulfonic acid (PFOS)	143	149	96	29-162
Perfluorooctanoic acid (PFOA)	197	160	123	52-147
Perfluoropentane sulfonic acid (PFPeS)	190	151	126	70-130
Perfluoropentanoic acid (PFPeA)	158	160	99	42-160
Perfluorotetradecanoic acid (PFTeDA)	152	160	95	47-169
Perfluorotridecanoic acid (PFTrDA)	168	160	105	45-160
Perfluoroundecanoic acid (PFUnDA)	188	160	118	53-141

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026
Date Analyzed: 06/06/18 14:10
Date Extracted: 06/05/18

Method Blank Summary

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Sample Name: Method Blank **Instrument ID:**K-LCMS-06
Lab Code: KQ1807475-04 **File ID:**J:\LCMS06\Data\060618_b1\060618_008
Analysis Method: PFC/537M **Analysis Lot:**593759
Prep Method: EPA 3535A **Extraction Lot:**315244

This Method Blank applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Lab Control Sample	KQ1807475-03	J:\LCMS06\Data\060618_b1\060618_009	06/06/18 14:21
MW-101S	K1805026-001	J:\LCMS06\Data\060618_b1\060618_010	06/06/18 14:31
MW-102S	K1805026-002	J:\LCMS06\Data\060618_b1\060618_011	06/06/18 14:42
MW-111S	K1805026-003	J:\LCMS06\Data\060618_b1\060618_012	06/06/18 14:52
MW-112S	K1805026-004	J:\LCMS06\Data\060618_b1\060618_013	06/06/18 15:03
Field DUP	K1805026-005	J:\LCMS06\Data\060618_b1\060618_014	06/06/18 15:13
Field Blank	K1805026-006	J:\LCMS06\Data\060618_b1\060618_015	06/06/18 15:23
Equip Blank	K1805026-007	J:\LCMS06\Data\060618_b1\060618_016	06/06/18 15:34
Trip Blank	K1805026-008	J:\LCMS06\Data\060618_b1\060618_017	06/06/18 15:44

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QA/QC Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Analyzed:** 06/06/18 14:21
Sample Matrix: Water **Date Extracted:** 06/05/18

Lab Control Sample Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Sample Name: Lab Control Sample **Instrument ID:**K-LCMS-06
Lab Code: KQ1807475-03 **File ID:**J:\LCMS06\Data\060618_b1\060618_009
Analysis Method: PFC/537M **Analysis Lot:**593759
Prep Method: EPA 3535A **Extraction Lot:**315244

This Lab Control Sample applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Method Blank	KQ1807475-04	J:\LCMS06\Data\060618_b1\060618_008	06/06/18 14:10
MW-101S	K1805026-001	J:\LCMS06\Data\060618_b1\060618_010	06/06/18 14:31
MW-102S	K1805026-002	J:\LCMS06\Data\060618_b1\060618_011	06/06/18 14:42
MW-111S	K1805026-003	J:\LCMS06\Data\060618_b1\060618_012	06/06/18 14:52
MW-112S	K1805026-004	J:\LCMS06\Data\060618_b1\060618_013	06/06/18 15:03
Field DUP	K1805026-005	J:\LCMS06\Data\060618_b1\060618_014	06/06/18 15:13
Field Blank	K1805026-006	J:\LCMS06\Data\060618_b1\060618_015	06/06/18 15:23
Equip Blank	K1805026-007	J:\LCMS06\Data\060618_b1\060618_016	06/06/18 15:34
Trip Blank	K1805026-008	J:\LCMS06\Data\060618_b1\060618_017	06/06/18 15:44

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/31/2018

Initial Calibration Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Calibration ID: KC1800231

Signal ID: 1

Instrument ID: K-LCMS-06

#	Lab Code	Sample Name	File Location	Acquisition Date
01	KC1800231-01	0.05 ppb ICAL	053118_107	05/31/2018 16:24
02	KC1800231-02	0.10 ppb ICAL	053118_108	05/31/2018 16:34
03	KC1800231-03	0.50 ppb ICAL	053118_109	05/31/2018 16:45
04	KC1800231-04	1.0 ppb ICAL	053118_110	05/31/2018 16:55
05	KC1800231-05	5.0 ppb ICAL	053118_111	05/31/2018 17:06
06	KC1800231-06	10.0 ppb ICAL	053118_112	05/31/2018 17:16
07	KC1800231-07	15.0 ppb ICAL	053118_113	05/31/2018 17:27

Analyte

13C2-4:2 FTS

#	Amount	RF									
01	5	0.9622	02	5	0.9109	03	5	0.9578	04	5	0.9008
05	5	0.8832	06	5	0.8606	07	5	0.8829			

13C2-6:2 FTS

#	Amount	RF									
01	5	0.5602	02	5	0.6419	03	5	0.6506	04	5	0.6374
05	5	0.6212	06	5	0.6024	07	5	0.6194			

13C2-8:2 FTS

#	Amount	RF									
01	5	0.4567	02	5	0.4519	03	5	0.4889	04	5	0.4923
05	5	0.4563	06	5	0.4315	07	5	0.4279			

13C2-PFDA

#	Amount	RF									
01	5	5.925	02	5	5.533	03	5	5.676	04	5	5.691
05	5	5.44	06	5	5.213	07	5	5.17			

13C2-PFDoDA

#	Amount	RF									
01	5	8.004	02	5	7.988	03	5	7.811	04	5	8.196
05	5	7.603	06	5	7.927	07	5	7.638			

13C2-PFHxA

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	5	5.974	02	5	6.576	03	5	6.682	04	5	6.17
05	5	6.357	06	5	6.08	07	5	6.041			

13C2-PFTeDA

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	5	6.129	02	5	5.71	03	5	5.845	04	5	6.17
05	5	5.548	06	5	5.481	07	5	5.361			

13C2-PFUnDA

#	Amount	RF									
01	5	6.297	02	5	6.226	03	5	6.436	04	5	6.309

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/31/2018

Initial Calibration Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Calibration ID: KC1800231

Signal ID: 1

Instrument ID: K-LCMS-06

Analyte

13C2-PFUnDA

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
05	5	6.179	06	5	5.966	07	5	5.817			

13C3-PFBS

#	Amount	RF									
01	5	1.418	02	5	1.399	03	5	1.422	04	5	1.439
05	5	1.385	06	5	1.306	07	5	1.338			

13C4-PFBA

#	Amount	RF									
01	5	3.948	02	5	3.829	03	5	4	04	5	3.987
05	5	3.88	06	5	3.751	07	5	3.876			

13C4-PFH_pA

#	Amount	RF									
01	5	5.875	02	5	4.79	03	5	5.14	04	5	5.987
05	5	4.841	06	5	4.692	07	5	5.083			

13C4-PFOA

#	Amount	RF									
01	5	7.965	02	5	8.596	03	5	9.344	04	5	8.753
05	5	9.012	06	5	8.315	07	5	8.312			

13C4-PFOS

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	5	1.078	02	5	0.9444	03	5	0.9721	04	5	1.047
05	5	0.9143	06	5	0.9315	07	5	0.9213			

13C5-PFNA

#	Amount	RF									
01	5	6.289	02	5	5.669	03	5	5.907	04	5	6.409
05	5	5.666	06	5	5.481	07	5	5.443			

13C5-PFPeA

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	5	2.115	02	5	2.052	03	5	2.133	04	5	2.14
05	5	2.061	06	5	1.973	07	5	2.02			

13C8-FOSA

#	Amount	RF									
01	5	2.413	02	5	2.349	03	5	2.431	04	5	2.462
05	5	2.355	06	5	2.295	07	5	2.348			

18O2-PFHxS

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	5	0.9533	02	5	0.9375	03	5	1.085	04	5	1.066
05	5	1.044	06	5	0.9697	07	5	0.9947			

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/31/2018

Initial Calibration Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Calibration ID: KC1800231

Signal ID: 1

Instrument ID: K-LCMS-06

Analyte

4:2 Fluorotelomer sulfonic acid (4:2 FTS)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.046861	1.141	02	0.0937218	0.968	03	0.468609	0.9225	04	0.937218	0.925
05	4.68609	0.8128	06	9.37218	0.8369	07	14.0583	0.7497			

6:2 Fluorotelomer sulfonic acid (6:2 FTS)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.047558	1.123	02	0.0951168	0.8893	03	0.475584	0.9126	04	0.951168	0.8791
05	4.75584	0.7689	06	9.51168	0.774	07	14.26755	0.709			

8:2 Fluorotelomer sulfonic acid (8:2 FTS)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.048002	1.196	02	0.0960045	1.052	03	0.480022	1.029	04	0.960045	1.005
05	4.80022	0.9385	06	9.60045	0.9507	07	14.40067	0.8855			

D3-MeFOSAA

#	Amount	RF									
01	5	1.643	02	5	1.557	03	5	1.547	04	5	1.713
05	5	1.518	06	5	1.483	07	5	1.485			

D5-EtFOSAA

#	Amount	RF									
01	5	1.602	02	5	1.667	03	5	1.712	04	5	1.756
05	5	1.594	06	5	1.498	07	5	1.536			

N-Ethyl perfluorooctane sulfonamidoacetic acid

#	Amount	RF									
02	0.1	0.2628	03	0.5	0.3767	04	1	0.3812	05	5	0.3787
06	10	0.4028	07	15	0.3774						

N-Methyl perfluorooctane sulfonamidoacetic acid

#	Amount	RF									
01	0.05	0.599	02	0.1	0.4396	03	0.5	0.3974	04	1	0.5183
05	5	0.4435	06	10	0.4791	07	15	0.4651			

Perfluorobutane sulfonic acid (PFBS)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
02	0.088737	1.274	03	0.443685	1.374	04	0.88737	1.297	05	4.43685	1.217
06	8.8737	1.284	07	13.31055	1.222						

Perfluorobutanoic acid (PFBA)

#	Amount	RF									
02	0.1	1.177	03	0.5	1.124	04	1	1.065	05	5	0.9929
06	10	1.037	07	15	1.008						

Perfluorodecane sulfonic acid (PFDS)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.048233	1.005	02	0.0964667	0.831	03	0.48233	0.839	04	0.964667	0.8034
05	4.8233	0.7641	06	9.64667	0.7861	07	14.46998	0.7648			

ALS Group USA, Corp.
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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/31/2018

Initial Calibration Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Calibration ID: KC1800231

Signal ID: 1

Instrument ID: K-LCMS-06

Analyte

Perfluorodecanoic acid (PFDA)

#	Amount	RF									
01	0.05	1.456	02	0.1	1.093	03	0.5	0.7744	04	1	0.7548
05	5	0.7291	06	10	0.7648	07	15	0.7116			

Perfluorododecanoic acid (PFDoDA)

#	Amount	RF									
01	0.05	0.9371	02	0.1	0.6604	03	0.5	0.6254	04	1	0.5867
05	5	0.5364	06	10	0.5781	07	15	0.5268			

Perfluoroheptane sulfonic acid (PFHps)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
02	0.0953438	0.4188	03	0.476719	0.6382	04	0.953438	0.5781	05	4.76719	0.6309
06	9.53438	0.662	07	14.3016	0.5835						

Perfluoroheptanoic acid (PFHpsA)

#	Amount	RF									
01	0.05	2.695	02	0.1	1.855	03	0.5	1.562	04	1	1.439
05	5	1.319	06	10	1.423	07	15	1.352			

Perfluorohexane sulfonic acid (PFHxS)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
02	0.0913075	1	03	0.456538	0.9707	04	0.913075	0.959	05	4.56538	0.8165
06	9.13075	0.9259	07	13.69613	0.8614						

Perfluorohexanoic acid (PFHxA)

#	Amount	RF									
01	0.05	2.021	02	0.1	1.352	03	0.5	1.029	04	1	0.9515
05	5	0.8643	06	10	0.8825	07	15	0.8691			

Perfluorononane sulfonic acid (PFNS)

#	Amount	RF									
02	0.096158	0.6038	03	0.480789	0.5774	04	0.961578	0.5521	05	4.807891	0.5724
06	9.615782	0.5107	07	14.42367	0.5026						

Perfluorononanoic acid (PFNA)

#	Amount	RF									
01	0.05	0.9404	02	0.1	1.023	03	0.5	0.8294	04	1	0.7761
05	5	0.7104	06	10	0.7535	07	15	0.7301			

Perfluorooctane sulfonamide (FOSA)

#	Amount	RF									
01	0.05	1.695	02	0.1	1.566	03	0.5	1.507	04	1	1.373
05	5	1.312	06	10	1.386	07	15	1.349			

Perfluorooctane sulfonic acid (PFOS)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.046461	0.7818	02	0.0929229	0.6413	03	0.464615	0.6746	04	0.929229	0.5739
05	4.64615	0.5799	06	9.29229	0.5705	07	13.93845	0.5694			

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/31/2018

Initial Calibration Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Calibration ID: KC1800231

Signal ID: 1

Instrument ID: K-LCMS-06

Analyte

Perfluorooctanoic acid (PFOA)

#	Amount	RF									
01	0.05	1.478	02	0.1	1.029	03	0.5	0.8102	04	1	0.7674
05	5	0.6697	06	10	0.7143	07	15	0.7425			

Perfluoropentane sulfonic acid (PFPeS)

#	Amount	RF									
02	0.094092	0.581	03	0.470462	0.542	04	0.940923	0.5351	05	4.704616	0.4409
06	9.409233	0.4786	07	14.11384	0.4715						

Perfluoropentanoic acid (PFPeA)

#	Amount	RF									
01	0.05	10.82	02	0.1	6.468	03	0.5	3.663	04	1	3.244
05	5	2.74	06	10	2.924	07	15	2.791			

Perfluorotetradecanoic acid (PFTeDA)

#	Amount	RF									
01	0.05	1.041	02	0.1	0.6091	03	0.5	0.4132	04	1	0.3169
05	5	0.3038	06	10	0.3046	07	15	0.2877			

Perfluorotridecanoic acid (PFTrDA)

#	Amount	RF									
02	0.1	0.8434	03	0.5	0.8838	04	1	0.7616	05	5	0.7606
06	10	0.7752	07	15	0.7457						

Perfluoroundecanoic acid (PFUnDA)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.05	1.416	02	0.1	1.047	03	0.5	0.7759	04	1	0.761
05	5	0.682	06	10	0.6993	07	15	0.6879			

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/31/2018

Initial Calibration Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Calibration ID: KC1800231

Signal ID: 1

Instrument ID: K-LCMS-06

Analyte Name	Compound Type	Calibration Evaluation			Calibration Evaluation	
		Fit Type	Eval	Eval Result	Control Criteria	Average RRF
13C2-4:2 FTS	SURR	Average RF	% RSD	4.3	20	0.9083
13C2-6:2 FTS	SURR	Average RF	% RSD	4.9	20	0.619
13C2-8:2 FTS	SURR	Average RF	% RSD	5.5	20	0.4579
13C2-PFDA	SURR	Average RF	% RSD	4.9	20	5.521
13C2-PFDoDA	SURR	Average RF	% RSD	2.7	20	7.881
13C2-PFHxA	SURR	Average RF	% RSD	4.4	20	6.269
13C2-PFTeDA	SURR	Average RF	% RSD	5.5	20	5.749
13C2-PFUnDA	SURR	Average RF	% RSD	3.5	20	6.176
13C3-PFBS	SURR	Average RF	% RSD	3.5	20	1.387
13C4-PFBA	SURR	Average RF	% RSD	2.3	20	3.896
13C4-PFHpA	SURR	Average RF	% RSD	10.1	20	5.201
13C4-PFOA	SURR	Average RF	% RSD	5.4	20	8.614
13C4-PFOS	SURR	Average RF	% RSD	6.7	20	0.9727
13C5-PFNA	SURR	Average RF	% RSD	6.5	20	5.838
13C5-PFPeA	SURR	Average RF	% RSD	3.0	20	2.071
13C8-FOSA	SURR	Average RF	% RSD	2.5	20	2.379
18O2-PFHxS	SURR	Average RF	% RSD	5.8	20	1.007
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	TRG	Average RF	% RSD	14.0	20	0.9079
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	TRG	Average RF	% RSD	15.8	20	0.8651
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	TRG	Average RF	% RSD	10.0	20	1.008
D3-MeFOSAA	SURR	Average RF	% RSD	5.5	20	1.564
D5-EtFOSAA	SURR	Average RF	% RSD	5.7	20	1.624
N-Ethyl perfluoroctane sulfonamidoacetic acid	TRG	Average RF	% RSD	13.8	20	0.3633
N-Methyl perfluoroctane sulfonamidoacetic acid	TRG	Average RF	% RSD	13.7	20	0.4774
Perfluorobutane sulfonic acid (PFBS)	TRG	Average RF	% RSD	4.5	20	1.278
Perfluorobutanoic acid (PFBA)	TRG	Average RF	% RSD	6.7	20	1.068
Perfluorodecane sulfonic acid (PFDS)	TRG	Average RF	% RSD	10.1	20	0.8277
Perfluorodecanoic acid (PFDA)	TRG	Linear	R2	0.9989	0.99	0.8978
Perfluorododecanoic acid (PFDoDA)	TRG	Linear	R2	0.9952	0.99	0.6358
Perfluoroheptane sulfonic acid (PFHxS)	TRG	Average RF	% RSD	15.0	20	0.5852
Perfluoroheptanoic acid (PFHpA)	TRG	Linear	R2	0.9973	0.99	1.664

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/31/2018

Initial Calibration Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Calibration ID: KC1800231

Signal ID: 1

Instrument ID: K-LCMS-06

Analyte Name	Compound Type	Calibration Evaluation			Calibration Evaluation	
		Fit Type	Eval	Eval Result	Control Criteria	Average RRF
Perfluorohexane sulfonic acid (PFHxS)	TRG	Average RF	% RSD	7.6	20	0.9223
Perfluorohexanoic acid (PFHxA)	TRG	Linear	R2	0.9985	0.99	1.139
Perfluorononane sulfonic acid (PFNS)	TRG	Average RF	% RSD	7.2	20	0.5532
Perfluorononanoic acid (PFNA)	TRG	Average RF	% RSD	14.2	20	0.8232
Perfluorooctane sulfonamide (FOSA)	TRG	Average RF	% RSD	9.5	20	1.456
Perfluorooctane sulfonic acid (PFOS)	TRG	Average RF	% RSD	12.7	20	0.6273
Perfluorooctanoic acid (PFOA)	TRG	Linear	R2	0.9984	0.99	0.8872
Perfluoropentane sulfonic acid (PFPeS)	TRG	Average RF	% RSD	10.4	20	0.5082
Perfluoropentanoic acid (PFPeA)	TRG	Linear	R2	0.9991	0.99	4.664
Perfluorotetradecanoic acid (PFTeDA)	TRG	Linear	R2	0.9945	0.99	0.468
Perfluorotridecanoic acid (PFTrDA)	TRG	Average RF	% RSD	7.0	20	0.7951
Perfluoroundecanoic acid (PFUnDA)	TRG	Linear	R2	0.9993	0.99	0.8671

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dba ALS Environmental

QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/31/2018

Initial Calibration Verification Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Calibration ID: KC1800231
Instrument ID: K-LCMS-06

Signal ID: 1

#	Lab Code	Sample Name	File Location	Acquisition Date		
08	KC1800231-08	1.0 ppb ICV	053118_115	05/31/2018 17:48		

Analyte Name	Expected	Result	Average RF	SSV RF	Rec.	Criteria	Curve Fit
Perfluorobutane sulfonic acid (PFBS)	0.887	0.617	1.278E0	8.887E-1	-30.451	±30	Average RF
Perfluoropentane sulfonic acid (PFPeS)	0.941	1.03	5.082E-1	5.555E-1	9.31	±30	Average RF
Perfluorohexane sulfonic acid (PFHxS)	0.913	1.03	9.223E-1	1.038E0	12.59	±30	Average RF
Perfluoroheptane sulfonic acid (PFHpS)	0.953	1.23	5.852E-1	7.523E-1	28.55	±30	Average RF
Perfluorooctane sulfonic acid (PFOS)	0.929	0.874	6.273E-1	5.898E-1	-5.981	±30	Average RF
Perfluorononane sulfonic acid (PFNS)	0.962	1.02	5.532E-1	5.89E-1	6.48	±30	Average RF
Perfluorodecane sulfonic acid (PFDS)	0.965	1.08	8.277E-1	9.306E-1	12.43	±30	Average RF
Perfluorobutanoic acid (PFBA)	1.00	1.03	1.068E0	1.101E0	3.16	±30	Average RF
Perfluoropentanoic acid (PFPeA)	1.00	1.05	4.664E0	3.326E0	5.40	±30	Linear
Perfluorohexanoic acid (PFHxA)	1.00	1.11	1.139E0	1.025E0	10.83	±30	Linear
Perfluoroheptanoic acid (PFHpA)	1.00	1.03	1.664E0	1.462E0	2.67	±30	Linear
Perfluorooctanoic acid (PFOA)	1.00	1.11	8.872E-1	8.3E-1	10.88	±30	Linear
Perfluorononanoic acid (PFNA)	1.00	1.00	8.232E-1	8.258E-1	0.317	±30	Average RF
Perfluorodecanoic acid (PFDA)	1.00	1.08	8.978E-1	8.222E-1	8.18	±30	Linear
Perfluoroundecanoic acid (PFUnDA)	1.00	1.09	8.671E-1	7.916E-1	8.60	±30	Linear
Perfluorododecanoic acid (PFDDoDA)	1.00	1.06	6.358E-1	5.993E-1	5.70	±30	Linear
Perfluorotridecanoic acid (PFTrDA)	1.00	1.12	7.951E-1	8.898E-1	11.91	±30	Average RF
Perfluorotetradecanoic acid (PFTeDA)	1.00	1.10	4.68E-1	3.6E-1	9.78	±30	Linear
Perfluorooctane sulfonamide (FOSA)	1.00	1.05	1.456E0	1.535E0	5.45	±30	Average RF
N-Methyl perfluorooctane sulfonamidoacetic acid	1.00	1.28	4.774E-1	6.109E-1	27.97	±30	Average RF
N-Ethyl perfluorooctane sulfonamidoacetic acid	1.00	1.14	3.633E-1	4.157E-1	14.43	±30	Average RF
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.937	0.926	9.079E-1	8.971E-1	-1.196	±30	Average RF
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.951	1.13	8.651E-1	1.024E0	18.31	±30	Average RF
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.960	0.925	1.008E0	9.714E-1	-3.644	±30	Average RF

Analyte Name	Expected	Result	Average RF	SSV RF	Rec.	Criteria	Curve Fit
13C3-PFBS	5.00	5.11	1.387E0	1.418E0	2.28	±30	Average RF
18O2-PFHxS	5.00	5.52	1.007E0	1.112E0	10.43	±30	Average RF
13C4-PFOS	5.00	5.13	9.727E-1	9.972E-1	2.52	±30	Average RF
13C4-PFBA	5.00	5.01	3.896E0	3.905E0	0.229	±30	Average RF
13C5-PFPeA	5.00	5.10	2.071E0	2.112E0	2.03	±30	Average RF

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/31/2018

Initial Calibration Verification Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Calibration ID: KC1800231
Instrument ID: K-LCMS-06

Signal ID: 1

Analyte Name	Expected	Result	Average RF	SSV RF	Rec.	Criteria	Curve Fit
13C2-PFHxA	5.00	4.96	6.269E0	6.216E0	-0.841	±30	Average RF
13C4-PFHpA	5.00	5.43	5.201E0	5.652E0	8.66	±30	Average RF
13C4-PFOA	5.00	5.07	8.614E0	8.73E0	1.35	±30	Average RF
13C5-PFNA	5.00	5.18	5.838E0	6.047E0	3.58	±30	Average RF
13C2-PFDA	5.00	5.07	5.521E0	5.602E0	1.47	±30	Average RF
13C2-PFUnDA	5.00	5.19	6.176E0	6.412E0	3.83	±30	Average RF
13C2-PFDoDA	5.00	5.41	7.881E0	8.526E0	8.18	±30	Average RF
13C2-PFTeDA	5.00	5.23	5.749E0	6.013E0	4.59	±30	Average RF
13C8-FOSA	5.00	5.03	2.379E0	2.394E0	0.629	±30	Average RF
D3-MeFOSAA	5.00	5.36	1.564E0	1.676E0	7.15	±30	Average RF
D5-EtFOSAA	5.00	5.34	1.624E0	1.733E0	6.76	±30	Average RF
13C2-4:2 FTS	5.00	5.17	9.083E-1	9.386E-1	3.33	±30	Average RF
13C2-6:2 FTS	5.00	5.28	6.19E-1	6.539E-1	5.63	±30	Average RF
13C2-8:2 FTS	5.00	5.39	4.579E-1	4.941E-1	7.90	±30	Average RF

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102

Service Request: K1805026
Date Analyzed: 06/06/18 13:49

Continuing Calibration Verification (CCV) Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
File ID: J:\LCMS06\Data\060618_b1\060618_006
Signal ID: 1

Calibration Date: 5/31/2018
Calibration ID: KC1800231
Analysis Lot: 593759
Units: ng/mL

Analyte Name	Expected	Result	Average RF	CCV RF	Rec.	% Drift	Criteria	Curve Fit
Perfluorobutane sulfonic acid (PFBS)	0.887	0.904	1.2778	1.3021	102	NA	±30	Average RF
Perfluoropentane sulfonic acid (PFPeS)	0.941	0.981	0.5082	0.5299	104	NA	±30	Average RF
Perfluorohexane sulfonic acid (PFHxS)	0.913	0.905	0.9223	0.9141	99.1	NA	±30	Average RF
Perfluoroheptane sulfonic acid (PFHpS)	0.953	1.02	0.5852	0.6261	107	NA	±30	Average RF
Perfluoroctane sulfonic acid (PFOS)	0.929	0.902	0.6273	0.6086	97.0	NA	±30	Average RF
Perfluorononane sulfonic acid (PFNS)	0.962	0.980	0.5532	0.564	102	NA	±30	Average RF
Perfluorodecane sulfonic acid (PFDS)	0.965	0.894	0.8277	0.7668	92.6	NA	±30	Average RF
Perfluorobutanoic acid (PFBA)	1.00	1.01	1.0677	1.0833	101	NA	±30	Average RF
Perfluoropentanoic acid (PFPeA)	1.00	1.01	4.6636	3.212	101	1.3	±30	Linear
Perfluorohexanoic acid (PFHxA)	1.00	1.07	1.1386	0.9905	107	6.9	±30	Linear
Perfluoroheptanoic acid (PFHpA)	1.00	0.978	1.6637	1.3954	97.8	-2.2	±30	Linear
Perfluoroctanoic acid (PFOA)	1.00	1.06	0.8872	0.7954	106	6.1	±30	Linear
Perfluorononanoic acid (PFNA)	1.00	0.995	0.8232	0.8187	99.5	NA	±30	Average RF
Perfluorodecanoic acid (PFDA)	1.00	0.985	0.8978	0.7519	98.5	-1.5	±30	Linear
Perfluoroundecanoic acid (PFUnDA)	1.00	1.02	0.8671	0.7448	102	1.9	±30	Linear
Perfluorododecanoic acid (PFDoDA)	1.00	1.04	0.6358	0.5889	104	3.8	±30	Linear
Perfluorotridecanoic acid (PFTrDA)	1.00	1.05	0.7951	0.8356	105	NA	±30	Average RF
Perfluorotetradecanoic acid (PFTeDA)	1.00	1.03	0.468	0.3394	103	2.8	±30	Linear
Perfluoroctane sulfonamide (FOSA)	1.00	0.938	1.4555	1.3659	93.8	NA	±30	Average RF
N-Methyl perfluoroctane sulfonamidoacetic acid	1.00	0.964	0.4774	0.4604	96.4	NA	±30	Average RF
N-Ethyl perfluoroctane sulfonamidoacetic acid	1.00	1.09	0.3633	0.3968	109	NA	±30	Average RF
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.937	0.930	0.9079	0.9007	99.2	NA	±30	Average RF
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.951	1.11	0.8651	1.009	117	NA	±30	Average RF
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.960	0.983	1.0082	1.0326	102	NA	±30	Average RF

Analyte Name	Expected	Result	Average RF	CCV RF	Rec.	% Drift	Criteria	Curve Fit
13C3-PFBS	5.00	6.15	1.3868	1.7061	123	NA	±30	Average RF
18O2-PFHxS	5.00	5.97	1.0072	1.2018	119	NA	±30	Average RF
13C4-PFOS	5.00	6.26	0.9727	1.217	125	NA	±30	Average RF
13C4-PFBA	5.00	5.97	3.8958	4.653	119	NA	±30	Average RF
13C5-PFPeA	5.00	5.97	2.0705	2.4712	119	NA	±30	Average RF

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102

Service Request: K1805026
Date Analyzed: 06/06/18 13:49

Continuing Calibration Verification (CCV) Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
File ID: J:\LCMS06\Data\060618_b1\060618_006
Signal ID: 1

Calibration Date: 5/31/2018
Calibration ID: KC1800231
Analysis Lot: 593759
Units: ng/mL

13C2-PFHxA	5.00	5.52	6.2687	6.9224	110	NA	±30	Average RF
13C4-PFHpA	5.00	6.49	5.2013	6.7463	130	NA	±30	Average RF
13C4-PFOA	5.00	5.52	8.6139	9.5161	110	NA	±30	Average RF
13C5-PFNA	5.00	6.12	5.8378	7.1483	122	NA	±30	Average RF
13C2-PFDA	5.00	6.12	5.5213	6.7595	122	NA	±30	Average RF
13C2-PFUnDA	5.00	6.25	6.1757	7.7227	125	NA	±30	Average RF
13C2-PFDoDA	5.00	5.78	7.881	9.1062	116	NA	±30	Average RF
13C2-PFTeDA	5.00	5.91	5.749	6.7935	118	NA	±30	Average RF
13C8-FOSA	5.00	5.99	2.379	2.8477	120	NA	±30	Average RF
D3-MeFOSAA	5.00	5.76	1.5637	1.8014	115	NA	±30	Average RF
D5-EtFOSAA	5.00	5.57	1.6235	1.8084	111	NA	±30	Average RF
13C2-4:2 FTS	5.00	5.24	0.9083	0.9512	105	NA	±30	Average RF
13C2-6:2 FTS	5.00	5.08	0.619	0.6295	102	NA	±30	Average RF
13C2-8:2 FTS	5.00	5.39	0.4579	0.4938	108	NA	±30	Average RF

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102

Service Request:K1805026

Analysis Run Log
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M

Analysis Lot:593759

Instrument ID:K-LCMS-06

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
J:\LCMS06\Data\060618_b1\060618_006	Continuing Calibration Verification	KQ1807567-01	6/6/2018	13:49	
J:\LCMS06\Data\060618_b1\060618_007	Continuing Calibration Blank	KQ1807567-02	6/6/2018	14:00	
J:\LCMS06\Data\060618_b1\060618_008	Method Blank	KQ1807475-04	6/6/2018	14:10	
J:\LCMS06\Data\060618_b1\060618_009	Lab Control Sample	KQ1807475-03	6/6/2018	14:21	
J:\LCMS06\Data\060618_b1\060618_010	MW-101S	K1805026-001	6/6/2018	14:31	
J:\LCMS06\Data\060618_b1\060618_011	MW-102S	K1805026-002	6/6/2018	14:42	
J:\LCMS06\Data\060618_b1\060618_012	MW-111S	K1805026-003	6/6/2018	14:52	
J:\LCMS06\Data\060618_b1\060618_013	MW-112S	K1805026-004	6/6/2018	15:03	
J:\LCMS06\Data\060618_b1\060618_014	Field DUP	K1805026-005	6/6/2018	15:13	
J:\LCMS06\Data\060618_b1\060618_015	Field Blank	K1805026-006	6/6/2018	15:23	
J:\LCMS06\Data\060618_b1\060618_016	Equip Blank	K1805026-007	6/6/2018	15:34	
J:\LCMS06\Data\060618_b1\060618_017	Trip Blank	K1805026-008	6/6/2018	15:44	
J:\LCMS06\Data\060618_b1\060618_018	ZZZZZZZ	ZZZZZZZ	6/6/2018	15:55	
J:\LCMS06\Data\060618_b1\060618_019	ZZZZZZZ	ZZZZZZZ	6/6/2018	16:05	
J:\LCMS06\Data\060618_b1\060618_020	ZZZZZZZ	ZZZZZZZ	6/6/2018	16:16	
J:\LCMS06\Data\060618_b1\060618_021	ZZZZZZZ	ZZZZZZZ	6/6/2018	16:26	
J:\LCMS06\Data\060618_b1\060618_022	ZZZZZZZ	ZZZZZZZ	6/6/2018	16:37	
J:\LCMS06\Data\060618_b1\060618_023	ZZZZZZZ	ZZZZZZZ	6/6/2018	16:47	
J:\LCMS06\Data\060618_b1\060618_024	ZZZZZZZ	ZZZZZZZ	6/6/2018	16:58	
J:\LCMS06\Data\060618_b1\060618_025	ZZZZZZZ	ZZZZZZZ	6/6/2018	17:08	
J:\LCMS06\Data\060618_b1\060618_026	ZZZZZZZ	ZZZZZZZ	6/6/2018	17:19	
J:\LCMS06\Data\060618_b1\060618_027	ZZZZZZZ	ZZZZZZZ	6/6/2018	17:29	
J:\LCMS06\Data\060618_b1\060618_031	ZZZZZZZ	ZZZZZZZ	6/6/2018	18:11	
J:\LCMS06\Data\060618_b1\060618_032	ZZZZZZZ	ZZZZZZZ	6/6/2018	18:21	
J:\LCMS06\Data\060618_b1\060618_033	ZZZZZZZ	ZZZZZZZ	6/6/2018	18:32	

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Prep Summary Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Prep Method: EPA 3535A
Analytical Method: PFC/537M

Extraction Lot: 315244
Extraction Date: 06/05/18 08:17

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
MW-101S	K1805026-001	5/29/18	5/30/18	280.0000 mL	8 mL	
MW-102S	K1805026-002	5/29/18	5/30/18	320.0000 mL	8 mL	
MW-111S	K1805026-003	5/29/18	5/30/18	320.0000 mL	8 mL	
MW-112S	K1805026-004	5/29/18	5/30/18	320.0000 mL	8 mL	
Field DUP	K1805026-005	5/29/18	5/30/18	320.0000 mL	8 mL	
Field Blank	K1805026-006	5/29/18	5/30/18	295.0000 mL	8 mL	
Equip Blank	K1805026-007	5/29/18	5/30/18	295.0000 mL	8 mL	
Trip Blank	K1805026-008	5/29/18	5/30/18	300.0000 mL	8 mL	
Lab Control Sample	KQ1807475-03LCS	NA	NA	250 mL	8 mL	
Method Blank	KQ1807475-04MB	NA	NA	250 mL	8 mL	



1,4-Dioxane by GC/MS

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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ALS Group USA, Corp.
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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18 12:22
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: MW-101S **Units:** ug/L
Lab Code: K1805026-001 **Basis:** NA

1,4-Dioxane by GC/MS Low Level

Analysis Method: 8270D SIM
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1,4-Dioxane	ND U	0.040	0.016	1	06/07/18 19:57	6/5/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,4-Dioxane-d8	87	48 - 118	06/07/18 19:57	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18 13:08
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: MW-102S **Units:** ug/L
Lab Code: K1805026-002 **Basis:** NA

1,4-Dioxane by GC/MS Low Level

Analysis Method: 8270D SIM
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1,4-Dioxane	ND U	0.040	0.016	1	06/07/18 20:15	6/5/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,4-Dioxane-d8	86	48 - 118	06/07/18 20:15	

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dba ALS Environmental

Analytical Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Sample Name: MW-111S
Lab Code: K1805026-003

Service Request: K1805026
Date Collected: 05/29/18 10:54
Date Received: 05/30/18 08:05

Units: ug/L
Basis: NA

1,4-Dioxane by GC/MS Low Level

Analysis Method: 8270D SIM
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1,4-Dioxane	ND U	0.040	0.016	1	06/07/18 20:33	6/5/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,4-Dioxane-d8	77	48 - 118	06/07/18 20:33	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18 14:02
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: MW-112S **Units:** ug/L
Lab Code: K1805026-004 **Basis:** NA

1,4-Dioxane by GC/MS Low Level

Analysis Method: 8270D SIM
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1,4-Dioxane	0.13	0.040	0.016	1	06/07/18 20:52	6/5/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,4-Dioxane-d8	79	48 - 118	06/07/18 20:52	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: Field DUP **Units:** ug/L
Lab Code: K1805026-005 **Basis:** NA

1,4-Dioxane by GC/MS Low Level

Analysis Method: 8270D SIM
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1,4-Dioxane	0.025 J	0.040	0.016	1	06/07/18 21:10	6/5/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,4-Dioxane-d8	80	48 - 118	06/07/18 21:10	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** 05/29/18
Sample Matrix: Water **Date Received:** 05/30/18 08:05

Sample Name: Trip Blank **Units:** ug/L
Lab Code: K1805026-008 **Basis:** NA

1,4-Dioxane by GC/MS Low Level

Analysis Method: 8270D SIM
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1,4-Dioxane	0.025 J	0.040	0.016	1	06/07/18 21:28	6/5/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,4-Dioxane-d8	86	48 - 118	06/07/18 21:28	

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Analytical Report

Client: Applied EcoSystems, Inc. **Service Request:** K1805026
Project: RACER Flint West #12994/11-4317-102 **Date Collected:** NA
Sample Matrix: Water **Date Received:** NA

Sample Name: Method Blank **Units:** ug/L
Lab Code: KQ1807478-03 **Basis:** NA

1,4-Dioxane by GC/MS Low Level

Analysis Method: 8270D SIM
Prep Method: EPA 3535A

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1,4-Dioxane	ND U	0.040	0.016	1	06/07/18 19:01	6/5/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,4-Dioxane-d8	80	48 - 118	06/07/18 19:01	

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026

SURROGATE RECOVERY SUMMARY
1,4-Dioxane by GC/MS Low Level

Analysis Method: 8270D SIM
Extraction Method: EPA 3535A

Sample Name	Lab Code	1,4-Dioxane-d8	
		48-118	
MW-101S	K1805026-001	87	
MW-102S	K1805026-002	86	
MW-111S	K1805026-003	77	
MW-112S	K1805026-004	79	
Field DUP	K1805026-005	80	
Trip Blank	K1805026-008	86	
Method Blank	KQ1807478-03	80	
Lab Control Sample	KQ1807478-01	89	
Duplicate Lab Control Sample	KQ1807478-02	82	

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102

Service Request:K1805026
Date Analyzed:06/07/18 16:16

Internal Standard Area and RT SUMMARY
1,4-Dioxane by GC/MS Low Level

File ID: J:\MS26\DATA\060718\0607F004.D\
Instrument ID: K-MS-26
Analysis Method: 8270D SIM

Lab Code:KQ1807673-02
Analysis Lot:594016
Signal ID:1

	1,4-Dichlorobenzene-d4	
	Area	RT
ICAL Result ==>	46,493	5.21
Upper Limit ==>	92,986	5.71
Lower Limit ==>	23,247	4.71

Associated Analyses

Method Blank	KQ1807478-03	40981	5.21
Lab Control Sample	KQ1807478-01	41846	5.21
Duplicate Lab Control Sample	KQ1807478-02	43671	5.21
MW-101S	K1805026-001	42933	5.21
MW-102S	K1805026-002	42233	5.21
MW-111S	K1805026-003	42600	5.21
MW-112S	K1805026-004	43537	5.21
Field DUP	K1805026-005	42964	5.21
Trip Blank	K1805026-008	40766	5.20

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026
Date Analyzed: 06/07/18
Date Extracted: 06/05/18

Duplicate Lab Control Sample Summary 1,4-Dioxane by GC/MS Low Level

Lab Control Sample KQ1807478-01				Duplicate Lab Control Sample KQ1807478-02					
Analyte Name	Result	Spike Amount	% Rec	Result	Spike Amount	% Rec	% Rec Limits	RPD	RPD Limit
1,4-Dioxane	0.886	1.00	89	0.819	1.00	82	52-111	8	30

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026
Date Analyzed: 06/07/18 19:01
Date Extracted: 06/05/18

Method Blank Summary
1,4-Dioxane by GC/MS Low Level

Sample Name: Method Blank **Instrument ID:**K-MS-26
Lab Code: KQ1807478-03 **File ID:**J:\MS26\DATA\060718\0607F013.D\
Analysis Method: 8270D SIM **Analysis Lot:**594016
Prep Method: EPA 3535A **Extraction Lot:**315249

This Method Blank applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Lab Control Sample	KQ1807478-01	J:\MS26\DATA\060718\0607F014.D\	06/07/18 19:20
Duplicate Lab Control Sample	KQ1807478-02	J:\MS26\DATA\060718\0607F015.D\	06/07/18 19:38
MW-101S	K1805026-001	J:\MS26\DATA\060718\0607F016.D\	06/07/18 19:57
MW-102S	K1805026-002	J:\MS26\DATA\060718\0607F017.D\	06/07/18 20:15
MW-111S	K1805026-003	J:\MS26\DATA\060718\0607F018.D\	06/07/18 20:33
MW-112S	K1805026-004	J:\MS26\DATA\060718\0607F019.D\	06/07/18 20:52
Field DUP	K1805026-005	J:\MS26\DATA\060718\0607F020.D\	06/07/18 21:10
Trip Blank	K1805026-008	J:\MS26\DATA\060718\0607F021.D\	06/07/18 21:28

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

Service Request: K1805026
Date Analyzed: 06/07/18 19:20
Date Extracted: 06/05/18

Lab Control Sample Summary
1,4-Dioxane by GC/MS Low Level

Sample Name: Lab Control Sample

Instrument ID:K-MS-26

Lab Code: KQ1807478-01

File ID:J:\MS26\DATA\060718\0607F014.D\

Analysis Method: 8270D SIM

Analysis Lot:594016

Prep Method: EPA 3535A

Extraction Lot:315249

This Lab Control Sample applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Method Blank	KQ1807478-03	J:\MS26\DATA\060718\0607F013.D\	06/07/18 19:01
Duplicate Lab Control Sample	KQ1807478-02	J:\MS26\DATA\060718\0607F015.D\	06/07/18 19:38
MW-101S	K1805026-001	J:\MS26\DATA\060718\0607F016.D\	06/07/18 19:57
MW-102S	K1805026-002	J:\MS26\DATA\060718\0607F017.D\	06/07/18 20:15
MW-111S	K1805026-003	J:\MS26\DATA\060718\0607F018.D\	06/07/18 20:33
MW-112S	K1805026-004	J:\MS26\DATA\060718\0607F019.D\	06/07/18 20:52
Field DUP	K1805026-005	J:\MS26\DATA\060718\0607F020.D\	06/07/18 21:10
Trip Blank	K1805026-008	J:\MS26\DATA\060718\0607F021.D\	06/07/18 21:28

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QC/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102

Service Request:K1805026
Date Analyzed:06/07/18 15:57

Tune Summary
1,4-Dioxane by GC/MS Low Level

File ID: J:\MS26\DATA\060718\0607F003.D\
Instrument ID: K-MS-26

Analytical Method: 8270D SIM
Analysis Lot: 594016

Target Mass	Relative to Mass	Lower Limit %	Upper Limit %	Relative Abundance %	Raw Abundance	Result Pass/Fail
51	198	10	80	18.97	480296	Pass
68	69	0	2	1.85	10929	Pass
69	198	0	100	23.30	589781	Pass
70	69	0	2	0.51	2983	Pass
127	198	10	80	38.06	963454	Pass
197	198	0	2	0.10	2554	Pass
198	442	30	100	82.11	2531720	Pass
199	198	5	9	6.72	170093	Pass
275	198	10	60	29.90	757056	Pass
365	442	1	50	2.81	86672	Pass
441	443	0.01	100	76.51	457130	Pass
442	442	100	100	100.00	3083264	Pass
443	442	15	24	19.38	597504	Pass

Sample Name	Lab Code	File ID:	Date Analyzed:	Q
Continuing Calibration Verification	KQ1807673-02	J:\MS26\DATA\060718\0607F004.D\	06/07/18 16:16	
Method Blank	KQ1807478-03	J:\MS26\DATA\060718\0607F013.D\	06/07/18 19:01	
Lab Control Sample	KQ1807478-01	J:\MS26\DATA\060718\0607F014.D\	06/07/18 19:20	
Duplicate Lab Control Sample	KQ1807478-02	J:\MS26\DATA\060718\0607F015.D\	06/07/18 19:38	
MW-101S	K1805026-001	J:\MS26\DATA\060718\0607F016.D\	06/07/18 19:57	
MW-102S	K1805026-002	J:\MS26\DATA\060718\0607F017.D\	06/07/18 20:15	
MW-111S	K1805026-003	J:\MS26\DATA\060718\0607F018.D\	06/07/18 20:33	
MW-112S	K1805026-004	J:\MS26\DATA\060718\0607F019.D\	06/07/18 20:52	
Field DUP	K1805026-005	J:\MS26\DATA\060718\0607F020.D\	06/07/18 21:10	
Trip Blank	K1805026-008	J:\MS26\DATA\060718\0607F021.D\	06/07/18 21:28	

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/22/2018

Initial Calibration Summary
1,4-Dioxane by GC/MS Low Level

Calibration ID: KC1800201

Signal ID: 1

Instrument ID: K-MS-26

#	Lab Code	Sample Name	File Location	Acquisition Date
01	KC1800201-01	1,4 DX ICAL 2.0ng/mL SVM58-93B	J:\MS26\DATA\052218\0522F006.D	05/22/2018 12:04
02	KC1800201-02	1,4 DX ICAL 4.0ng/mL SVM58-93C	J:\MS26\DATA\052218\0522F007.D	05/22/2018 12:22
03	KC1800201-03	1,4 DX ICAL 10.0ng/mL SVM58-93D	J:\MS26\DATA\052218\0522F008.D	05/22/2018 12:40
04	KC1800201-04	1,4 DX ICAL 20.0ng/mL SVM58-93E	J:\MS26\DATA\052218\0522F009.D	05/22/2018 12:59
05	KC1800201-05	1,4 DX ICAL 50.0ng/mL SVM58-93F	J:\MS26\DATA\052218\0522F010.D	05/22/2018 13:17
06	KC1800201-06	1,4 DX ICAL 100ng/mL SVM58-93G	J:\MS26\DATA\052218\0522F011.D	05/22/2018 13:35
07	KC1800201-07	1,4 DX ICAL 200ng/mL SVM58-93H	J:\MS26\DATA\052218\0522F012.D	05/22/2018 13:54

Analyte

1,4-Dioxane											
#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	0.3912	02	4.000	0.3887	03	10.000	0.4019	04	20.000	0.4209
05	50.000	0.4071	06	100.000	0.4222	07	200.000	0.4119			

1,4-Dioxane-d8

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	0.4527	02	4.000	0.4089	03	10.000	0.4073	04	20.000	0.4023
05	50.000	0.3955	06	100.000	0.3998	07	200.000	0.3955			

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/22/2018

Initial Calibration Summary
1,4-Dioxane by GC/MS Low Level

Calibration ID: KC1800201

Signal ID: 1

Instrument ID: K-MS-26

Analyte Name	Compound Type	Calibration Evaluation			Calibration Evaluation		
		Fit Type	Eval	Eval Result	Control Criteria	Average RRF	Minimum RRF
1,4-Dioxane	TRG	Average RF	% RSD	3.3	20	0.4063	0.01
1,4-Dioxane-d8	SURR	Average RF	% RSD	4.9	20	0.4089	0.01

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994

Service Request: K1805026
Calibration Date: 5/22/2018

Initial Calibration Verification Summary
1,4-Dioxane by GC/MS Low Level

Calibration ID: KC1800201
Instrument ID: K-MS-26

Signal ID: 1

#	Lab Code	Sample Name	File Location	Acquisition Date
08	KC1800201-08	1,4 DX ICV 20ng/mL SVM58-93I	J:\MS26\DATA\052218\0522F013.D	05/22/2018 14:12

Analyte Name	Expected	Result	Average RF	SSV RF	% D	Criteria	Curve Fit
1,4-Dioxane	20.0	20.5	4.063E-1	4.167E-1	2.57	±30	Average RF

Analyte Name	Expected	Result	Average RF	SSV RF	% D	Criteria	Curve Fit
1,4-Dioxane-d8	20.0	21.4	4.089E-1	4.372E-1	6.92	±30	Average RF

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102

Service Request: K1805026
Date Analyzed: 06/07/18 16:16

Continuing Calibration Verification (CCV) Summary 1,4-Dioxane by GC/MS Low Level

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
1,4-Dioxane	20.0	21.5	0.4063	0.4374	7.7	NA	±20	Average RF
Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
1,4-Dioxane-d8	20.0	19.1	0.4089	0.3902	-4.6	NA	±20	Average RF

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QA/QC Report

Client: Applied EcoSystems, Inc.
Project: RACER Flint West #12994/11-4317-102

Service Request:K1805026

Analysis Run Log
1,4-Dioxane by GC/MS Low Level

Analysis Method:

Analysis Lot:594016
Instrument ID:K-MS-26

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
J:\MS26\DATA\060718\0607F003.D\	ZZZZZZZ	ZZZZZZZ	6/7/2018	15:57:00	
J:\MS26\DATA\060718\0607F004.D\	Continuing Calibration Verification	KQ1807673-02	6/7/2018	16:16:00	
J:\MS26\DATA\060718\0607F005.D\	ZZZZZZZ	ZZZZZZZ	6/7/2018	16:34:00	
J:\MS26\DATA\060718\0607F006.D\	ZZZZZZZ	ZZZZZZZ	6/7/2018	16:53:00	
J:\MS26\DATA\060718\0607F007.D\	ZZZZZZZ	ZZZZZZZ	6/7/2018	17:11:00	
J:\MS26\DATA\060718\0607F008.D\	ZZZZZZZ	ZZZZZZZ	6/7/2018	17:30:00	
J:\MS26\DATA\060718\0607F009.D\	ZZZZZZZ	ZZZZZZZ	6/7/2018	17:48:00	
J:\MS26\DATA\060718\0607F010.D\	ZZZZZZZ	ZZZZZZZ	6/7/2018	18:06:00	
J:\MS26\DATA\060718\0607F011.D\	ZZZZZZZ	ZZZZZZZ	6/7/2018	18:25:00	
J:\MS26\DATA\060718\0607F012.D\	ZZZZZZZ	ZZZZZZZ	6/7/2018	18:43:00	
J:\MS26\DATA\060718\0607F013.D\	Method Blank	KQ1807478-03	6/7/2018	19:01:00	
J:\MS26\DATA\060718\0607F014.D\	Lab Control Sample	KQ1807478-01	6/7/2018	19:20:00	
J:\MS26\DATA\060718\0607F015.D\	Duplicate Lab Control Sample	KQ1807478-02	6/7/2018	19:38:00	
J:\MS26\DATA\060718\0607F016.D\	MW-101S	K1805026-001	6/7/2018	19:57:00	
J:\MS26\DATA\060718\0607F017.D\	MW-102S	K1805026-002	6/7/2018	20:15:00	
J:\MS26\DATA\060718\0607F018.D\	MW-111S	K1805026-003	6/7/2018	20:33:00	
J:\MS26\DATA\060718\0607F019.D\	MW-112S	K1805026-004	6/7/2018	20:52:00	
J:\MS26\DATA\060718\0607F020.D\	Field DUP	K1805026-005	6/7/2018	21:10:00	
J:\MS26\DATA\060718\0607F021.D\	Trip Blank	K1805026-008	6/7/2018	21:28:00	

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Prep Summary Report

Client: Applied EcoSystems, Inc. **Service Request:**K1805026
Project: RACER Flint West #12994/11-4317-102
Sample Matrix: Water

1,4-Dioxane by GC/MS Low Level

Prep Method: EPA 3535A **Extraction Lot:** 315249
Analytical Method: 8270D SIM **Extraction Date:** 06/05/18 09:30

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
MW-101S	K1805026-001	5/29/18	5/30/18	100 mL	2 mL	
MW-102S	K1805026-002	5/29/18	5/30/18	100 mL	2 mL	
MW-111S	K1805026-003	5/29/18	5/30/18	100 mL	2 mL	
MW-112S	K1805026-004	5/29/18	5/30/18	100 mL	2 mL	
Field DUP	K1805026-005	5/29/18	5/30/18	100 mL	2 mL	
Trip Blank	K1805026-008	5/29/18	5/30/18	100 mL	2 mL	
Lab Control Sample	KQ1807478-01LCS	NA	NA	100 mL	2 mL	
Duplicate Lab Control Sample	KQ1807478-02DLCS	NA	NA	100 mL	2 mL	
Method Blank	KQ1807478-03MB	NA	NA	100 mL	2 mL	